Heating and Ventilating

For Engineers and Contractors Controlling the Design, Specification, Installation and Maintenance of Heating, Ventilating and Air Conditioning

Volume 31 JULY, 1934 Number 7

CONTENTS

Some Practical Aspects of Air Conditioning ..... *W. Lincoln Boyden, Jr.* 19
Long Range Weather Forecasts Based on Sun Radiation 22
Air Conditioning Uses and Advantages Studied by Utilities 23
Modernizing Section 29-36
A. S. H. V. E. Holds Summer Meeting in the Poconos 37
District Heating Engineers Hold 25th Convention 39
Air Cooling at the 1934 Century of Progress 40
Relationship of Heat Demand, Radiator Surface, and Steam Conditions 42

DEPARTMENTS

Reference Data, 35 and 36, Combustion Data—Oil ..... Opposite 42
Abstracts 43
Editorials 44
News of the Month 45
Picture Paragraphs 54
Business Briefs 63
New Equipment 64
Degree-Days for May, 1934 70
The Weather for May, 1934 72
New Catalogs 75

Published Monthly by

THE INDUSTRIAL PRESS, 148 LAFAYETTE STREET, NEW YORK

ROBERT B. LUCHARS President EDGAR A. BECKER, Vice-Pres. and Treasurer ERIK OBERG Secretary
C. H. B. HOTCHKISS, Editor CLIFFORD STROCK, Associate Editor
CLIFF W. PRESDEE, Advertising Manager GEORGE G. TURNER Western Representative JOHN F. HYDE, Eastern Representative

Subscription, $2 per year in United States and Mexico. $2.50 in Canada. $3 all other countries. Single copies regular issue, 30 cents; special issues, $1.

Does YOUR Heating Pump Have These Modern Features?

√ Check Here	
NO ELECTRIC CURRENT REQUIRED Biggest single expense item eliminated	
SIMPLE IN CONSTRUCTION Only one moving element	
NO PARTS IN METALLIC CONTACT The liquid seal does that	
NO INTERNAL LUBRICATION No oil can get to boilers	
CONTROLLED CONTINUOUS OPERATION Always maintains uniform conditions in system	
NO EXPERT ATTENDANCE Install them and forget them	
SAVES STEAM Shows marked steam economy compared with any other Return Line Heating Pump	

MAIL THIS COUPON FOR FULL DATA COVERING THE JENNINGS VAPOR TURBINE (NON-ELECTRIC) HEATING PUMP

NAME	TITLE
COMPANY	
STREET	CITY

CHECK BELOW IF YOU WOULD LIKE ADDITIONAL INFORMATION COVERING ANY OF PUMPS LISTED

AIR COMPRESSORS "CLEAN AIR"		CENTRIFUGAL PUMPS "BALANCED"	
VACUUM PUMPS "NO PULSATION"		CENTRIFUGAL PUMPS "SELF PRIMING"	
RETURN LINE HEATING PUMPS "NO METALLIC CONTACT"		SUMP AND SEWAGE PUMPS "NO WORKING PARTS IN PIT"	
CONDENSATION PUMPS "HIGH EFFICIENCY"		SEWAGE EJECTORS "NO AIR VALVES NOR TANKS"	

THE NASH ENGINEERING COMPANY

SOUTH NORWALK, CONNECTICUT, U. S. A.

Some Practical Aspects of Air Conditioning

By W. LINCOLN BOYDEN, JR.†

Bids were asked on a specification, and the results were so varied, that the author analyzed them. Read his findings and his suggestion of what should be done.

IF a client well sold on the idea of air conditioning had not come to us with this problem, our attention would probably not have been forcibly drawn to several of the problems which have to be faced in the process of selecting an air conditioner. However, the fact is that such a client came to us, after first trying to investigate for himself and becoming well befuddled by the conflicting stories to which he had been subjected. We agreed to go into the problem which he presented and, as a result, we find a situation which, if anything, is more confusing than is generally supposed.

As we go over it, it seems to us that there are two points especially worth noting. One of these is the lack of uniformity in arriving at the basic figures on which estimates are made, and the second is the absence of any uniform, or standard, specifications. In our opinion these two difficulties are closely related and the object of describing our experience with this client's case is to call attention to the great discrepancy between bids received on the same job and, secondarily, to suggest a form of specification which, it is hoped, may help in arriving at a solution.

The problem that our client presented seemed on its face a very simple one. It had to do with a 10-room house located in this region, which he desired to have completely air conditioned, using a central plant, and including suitable heating in winter and cooling in summer. It seemed like an entirely normal requirement and one which any prospective builder of a house might reasonably ask.

The first thing done was to draw up a specification outlining the requirements of the owner, and then to send the specification to contractors with the request that they submit a proposal. The specification as drawn called for adequate heating from 0° to 70° and for cooling, 15° maximum; for ventilation equivalent to five air changes per hour; for cleaning; humidifying, etc. The specification was arranged with questions in such a form as to bring out how each function was to be performed, and to give a clue to probable operating costs, maintenance requirements, and general efficiency. We felt that the use of this method would show if any contractors were proposing the use of partial conditioning instead of full year 'round and that the specification as drawn presented a fair and equitable proposal on which contractors could bid on an equal basis. Since the air conditioning is dependent to some extent on the source of heat, cooling, and on the duct system, it was decided to include these items in the proposal as well. Thus, a complete installation from an oil tank buried in the yard to finished grilles in each room was called for.

This specification, together with the necessary data and a set of blueprints, were furnished to each bidder. We found 11 who were qualified to figure and actually received proposals back from 8 of them. The other three for one reason or another, submitted no proposal.

When the proposals came back the first evident point was that there was a wide range in price. A little more examination revealed at once that there was also a considerable range in probable performance. On examining the several bids we found that the prices proposed ranged from $1590 to $5250. These two extremes seemed so discrepant that we decided to go into the eight bids with a view to determining what caused the extreme variation, and also to analyze each to see if all proposals contained essentially similar material.

As a result the chart, which appears on the next page, was drawn up to give this information in table form and is based on replies to the combined specification-questionnaire. Although approximate in some ways, it is, in our opinion, a fair index of the wide range in price and performance likely to be encountered by one who, like ourselves, calls for specific proposals. Performance comparisons based on the figures given in the table indicate clearly that some of the proposals are inadequate in spots, while others are too powerful. Price comparisons are woefully unfair until the inadequate and deficient items are taken into account. The figures at the bottom (Item 22) are our own and are intended solely to call attention to these adjustment items.

It seems to us that some of the points raised by the figures in the chart are well worth consideration in detail.

First of all, the estimated heat load of the building (Item 1) and the estimated cooling load (Item 6) give a clue to the very great variations in price, although they do not account for them entirely. The very fact that eight bidders, all working from the same building plan, and also supposedly computing the losses for the same heat load conditions, show a range of from 80,000 to 150,000 B.t.u. per hr., is significant. It shows that either the methods used in making the computations are incorrect, or that the figures have been very

†Office of Kilham, Hopkins & Greeley, architects, Boston.

CONDENSED TABLE SHOWING COST AND PERFORMANCE OF VARIOUS AIR CONDITIONERS

ITEM	AIR CONDITIONING COMPANIES	Nº1	Nº2	Nº3	Nº4	Nº5	Nº6	Nº7	Nº8
1	ESTIMATED HEATING LOAD OF BLDG. IN B.T.U./HR.	131,900 - 0°F.-70°F.	119,400 D°	103,000 D°	116,700 D°	150,000 D°	80,000. D°	136,300 D°	108,600 D°
2	OUTPUT OF HEAT EXCHANGER [STEAM] B.T.U./HR.	230,000 #	150,000	120,000	130,000	225,000	100,000	152,000	160,000
3	MARGIN OF ITEM 2 OVER 1 IN %	75%	25%	18%	12%	50%	25%	12%	47%
4	TYPE OF SYSTEM	SPLIT	SPLIT	DIRECT	SPLIT	SPLIT	SPLIT	DIRECT	SPLIT
5	ESTIMATED OPERATING COST IN CENTS/HR.	11.09¢	11.35¢	11.83¢	11.8 ¢	12.77¢	11.14 ¢	13.45¢	12.6¢
	A OIL - ½ GAL @ 6½¢ ASSUMED FOR EACH	1.5 GAL @ 2 = 9.75¢	D°	D°	D°	D°	D°	D°	D°
	B GAL. WASTE WATER/HR. @ 2.2¢/100 GAL.	½ GAL.	0	30 GAL.	10 GAL.	2 GAL	0	36 GAL.	½ GAL.
	C TOTAL H.P. ELECTRICITY USED @ 6½¢/KW.	4/15 H.P. = .200 KW.	⅓ H.P. = .250 KW	3/10 H.P. = .225 KW.	⅜ H.P. = .280 KW	⅝ H.P. = .465	1/24 H.P. = .215 KW.	⅝ HP. = .465 KW	7/12 H.P. = .437 KW
6	ESTIMATED COOLING LOAD OF BLDG IN B.T.U./HR.	35,500 FOR 15°F	NONE FIGURED MECH. REF. IF ANY.	54,000 FOR 15°F	NONE FIGURED MECH. REF. IF ANY.	30,000 FOR 15°F	25,500 FOR 10°F #	76,000 FOR 15°F.	24,000 # FOR 15°F
7	HEAT ABSORBTION OF EXCHANGER B.T.U./HR.	40,000		60,000		32,000	24,000	85,000	36,000
8	MARGIN OF ITEM 7 OVER 6 IN %	21%		11%		7%	MINUS 6%	12%	50%
9	TYPE OF COOLING SYSTEM	TAP WATER		MECH. REF		MECH. REF	MECH. REF.	MECH. REF	MECH. REF.
10	ESTIMATED OPERATING COST IN CENTS/HR.	6.75¢		32.2¢		21.14¢	13.3¢	46.9¢	23.2¢
	A. GAL. WASTE WATER/HR. ENTERING AT 65°F. MAX.	275 GAL.		300 GAL.		186 GAL.	125 GAL.	500 GAL.	280 GAL.
	B. TOTAL H.P. ELECTRICITY USED	⅛ H.P. = .125 KW		5¼ H.P. = 3.985 KW.		3½ H.P. = 2.625	2⅛ H.P. = 1.625 KW	7½ H.P. = 5.625 KW	3½ H.P. = 2.625 KW.
11	TYPE OF HEAT EXCHANGER FOR HEATING	COPPER FIN COUNTERFLOW	COPPER FIN CROSSFLOW	DIRECT ON CASTING	AEROFIN U COIL	AEROFIN CROSSFLOW	AEROFIN - CROSSFLOW	DIRECT ON CASTING	COPPERFIN CROSSFLOW
12	" " " " " COOLING	SAME " "	NONE	COPPER FIN COIL	NONE	COPPER FIN COIL	COPPER FIN COIL	COPPER FIN COIL	SAME " "
13	TYPE OF FILTER IF ANY	NONE SEE WASHER	STEEL WOOL	SPUN GLASS	STEEL WOOL	STEEL WOOL	STEEL WOOL	STEEL WOOL	BAG - COTTON
	A AREA IN SQ.IN.		1280 SQ. IN.	800 SQ.IN.	800 SQ IN.	1600 SQ. IN.	NOT GIVEN	2652 SQ.IN.	
	B MAINTENANCE REQUIREMENT		CLEAN ONCE / MO.	RENEW ONCE/YEAR	CLEAN AT 2-4 MONTHS	RENEW AT 6 MONTHS	RENEW ONCE /YEAR	CLEAN AT 3 MONTHS	LAUNDER AT 6 MO.
14	TYPE OF WASHER IF ANY	CENTRIFUGAL SPRAY	NONE	SPRAY JETS	CONTACT WET SURFACES	BAFFLED SPRAY	NONE	SPRAY JETS	NONE
	A % OF TIME IN OPERATION	90 - 100%		20%	25-40%	20-25%		20%	
	B MAINTENANCE REQUIREMENT	SELF CLEANING		CLEAN NOZZLES AT 2 MO	CLEAN ONCE / YEAR	CLEAN ONCE / YEAR.		CLEAN NOZZLES 1/YR	
15	TYPE OF HUMIDIFIER	SEE WASHER	PAN	SEE WASHER	DRIP	SEE WASHER	PAN	SEE WASHER	ATOMIZED SPRAY
16	TYPE OF FAN	MULTIBLADE	MULTIVANE	DOUBLE MULTIVANE	DOUBLE MULTIVANE	MULTIVANE	TRIPLE MULTIVANE	12 BLADE MULTIVANE	MULTIVANE
	A CUBIC FT./MIN DELIVERY AT ¼" STATIC PRESSURE	2,000	NOT GIVEN	2000	1600	6900	1000	4600	1700
	B HORSEPOWER OF FAN MOTOR & CONNECTION	⅙ H.P. DIRECT	⅙ H.P. V BELT	¼ H.P. V BELT	¼ H.P. V BELT	½ H.P. V BELT	⅙ H.P. V BELT	½ H.P. V BELT	⅓ H.P. V BELT
	C % OF TIME FAN IN OPERATION	100%	INTERMIT'NT 40-60%	INTERMIT'NT 50%	INTERMIT'NT 30%	100% OR INTERMIT'NT	INTERMITTANT 60%	INTERMIT'NT 60%	INTERMIT'NT - 60%
	D CONSTANT OR VARYING SPEED	VARYING	CONSTANT	CONSTANT	CONSTANT	CONSTANT	CONSTANT.	VARYING	VARYING
17	DUCT SYSTEM — GENERAL LAYOUT	COMPLETE	INCOMPLETE	COMPLETE	INCOMPLETE	COMPLETE	INCOMPLETE	COMPLETE	COMPLETE
	A SPEED OF AIR AT SUPPLY GRILLES IN FT./MIN.	180-200'	250'	250'	300'	500'	250'	600'	275'
	B MAX. TEMP. OF AIR AT SUPPLY GRILLES IN °F.	130°F	150°F	130°F	140°F	155°F	145°F	110°F	130°F
	C RECOMMENDED LOCATION OF SUPPLY GRILLES	7'0" UP, INSIDE WALL ALL ROOMS	UNDER WINDOW OUTSIDE WALL-ALL ROOMS	7'-0" UP ON INSIDE WALL ALL ROOMS	7'-0" UP-INSIDE WALL ALL ROOMS.	7'-0" UP - INSIDE WALL	UNDER WINDOWS-OUTSIDE WALL-ALL ROOMS	7'-0" UP INSIDE WALL ALL ROOMS.	7'-0" UP INSIDE WALL ALL ROOMS
	D RECOMMENDED LOCATION OF RETURN GRILLES	BASEBD OUTSIDE WALL ALL ROOMS	FLOOR — TWO ONLY AT CENTRAL POINTS.	BASEBD OR FLOOR ANY WALL - ALL ROOMS.	BASEBD - ANY WALL MAIN ROOMS.	BASE BD OR FLOOR ANY WALL - ALL ROOMS	FLOOR — TWO ONLY AT CENTRAL POINTS.	BASEBD - ANY WALL ALL ROOMS.	BASEBD - INSIDE WALL ALL ROOMS.
18	DEODORIZATION CHARACTERISTICS IN % OF TIME	DILUTION 100% SPRAY 30%	DILUTION 40-60 %	DILUTION 50% - SPRAY 20%	DILUTION 30% WASH 40%	DILUTION 100% SPRAY 25%	DILUTION 60%	DILUTION 60% SPRAY 20%	DILUTION 60%
19	PROVISION FOR DIRECT RADIATION IN GARAGE	BOILER	BOILER	SEPARATE COIL	BOILER	BOILER	BOILER	NONE	BOILER
20	PROVISION FOR DOMESTIC HOT WATER	BOILER	BOILER	NONE	BOILER	BOILER	BOILER	NONE	BOILER
21	PRICE, INSTALLED WITH 1 YEAR GUARANTEE	$ 2257.00	$ 1590.00	$ 2985.00	$ 2472.00	$ 4050.00	$ 3115.00	$ 3800.00	$ 5250.00
22	ALOWANCE FOR ITEMS EITHER DEFICIENT OR LACKING	NONE	ITEMS 6-9 & 17 D	# 2	# 2, 17 D, & 6-9	NONE	# 2, 6-9, 16, 17 D, & 22 A	# 22 A	NONE.
	A OIL BURNER						$ 300.00	$ 300.00	
	B BOILER AND/OR HEAT EXCHANGER	# COOLING REQ. CONTROL	$ 100.00		$ 250.00		$ 200.00		
	C COOLING EQUIPMENT		$ 1250.00		$ 1250.00		$ 250.00 # 15°F REQ.		# WITH AWNINGS
	D FAN DELIVERY		?				50.00		
	E DUCT SYSTEM		$ 150.00		$ 100.00		$ 150.00		
23	ADJUSTED PRICE — APPROXIMATE ONLY	$ 2257.00	$ 2990.00	$ 3035.00	$ 4,072.00	$ 4050.00	$ 4065.00	$ 4100.00	$ 5250.00

Comparison of estimated heating loads, heating operating costs, estimated cooling loads, and cooling operating costs, equipment specified and estimated cost of system as submitted by eight different bidders.

much misapplied. Our own computation, based on what seems like the most generally accepted method of computing, comes out at about 125,000 B.t.u. per hr.

The same thing applies to the estimated cooling load (Item 6). The figures vary all the way from 24,000 B.t.u. per hr. to 76,000 B.t.u. per hr., which gives a wider percentage range than in the heating load. It will also be noted that the figures for cooling requirements show a decided tendency to vary on the high side, while those for heating tend toward the low side.

It seems to us that the wide variation in these two figures leads to the conclusion that one of the difficulties confronting the air conditioning industry is that everyone cannot be trusted to select the proper capacity. Whether this is due to lack of training or to a fundamental disagreement over the loads and methods of computing, we have no means of knowing. The fact does remain, however, that the figures as submitted show variations which simply cannot be justified.

Another point wherein there is very great disagreement among the several bidders is in the margin of heat output allowed for in the heat exchanger for both heating (Item 2) and for cooling (Item 7). Assuming that each bidder's original estimate of the loads is correct, good practice allows from 15% to 20% of reserve capacity. Examination of Item 3 will show that among the several bidders this reserve allowance for the heat exchanger varied all the way from 7% to 75%. It will be noted that Bidder No. 1 who allowed 75% reserve capacity in the exchanger, plans on using the same exchanger for cooling. In designing for this, the margin for heating is excessive.

In the case of cooling, however (Item 7), the tendency was to have a more conservative margin and the reserve capacities varied only from 7% to 50% of the estimated load. This would lead to the conclusion that there is less tendency to oversize the cooling surface than to oversize the heating surface when load computations form the basis of estimating the amount of surface to be used.

Examination of the several items of the table, one at a time, will show very little agreement among the several bidders. For instance, bidders No. 2 and No. 4 recommended the use of mechanical refrigeration if any were used, but neither bidder included this in his price. Nearly all of the bidders propose to use a split system with only two using the direct method. These two take care of any direct radiation and domestic hot water by providing a separate coil in the heat chamber.

There was considerable unanimity of opinion as to where supply grilles should be located with all but two recommending that they be put near the ceiling on the inside wall, while the other two suggested locating them near the windows on the outside wall. All suggested placing the return grilles at the floor or base, but two proposed using only two centrally located return grilles in the first floor instead of having one in every room as specified.

In regard to air speeds in the duct system and temperatures at the grille (Items 17A and B), while temperatures were reasonably steady at around 140° the speed of the air at the supply grilles varied from 180 f.p.m. to 600 f.p.m. The two contractors who proposed placing their supply grilles under the windows were in substantial agreement regarding the temperature of the air at the grille and the velocity at the supply. Just why there should be so great a variation in the recommended speed of the air leaving the grille when the supply is located near the ceiling on the inside wall is not apparent, unless some are figuring as they would for an auditorium while others enlarge ducts and step the speed down for domestic work.

There was variety in the suggestions about the type of filter (Item 13) and the areas provided (Item 13A) appear to have very little relation to the recommended frequency of cleaning.

In spite of the specifications having called for enough air to change the volume of the building five times per hour, the air delivered at ¼ in. pressure (Item 16A) shows a variation from 1000 c.f.m. to 6900 c.f.m., and the fan motor varied from 1/6 hp. to ½ hp. The percentage of time in operation (Item 16C) was fairly uniform for those of the intermittent type with the estimates running around 60%. Two can operate 100% of the time which is a feature well worth noting.

Estimated Operating Costs

Estimated operating costs for heating (Item 5) are necessarily approximate due to a variety of conditions. The oil consumption (Item 5A) is assumed at 1½ gal. per hr., with oil costing 6½ cents per gal. The variation in costs thus show the varying amounts of water and electricity required by the air conditioner alone. Complications are introduced in those cases where the plant operates 100% of the time, for, although they are giving air conditioning in the hours while those of the intermittent type are giving nothing, it may cost something to do this. Just how much is difficult to say, but elimination of frequent starting loads should cut down the difference appreciably. The real question to be borne in mind is—what does each machine give for its relative cost of operation?

In those cases where washer-type humidifiers are proposed, it will be noted that the waste water ranges all the way from 2 gal. to 36 gal. per hr. (Item 5B). The estimated kilowatts (Item 5C) vary from 0.2 to 0.465 per hr. For cooling, water quantities vary from 125 gal. to 500 gal. per hr., and the electricity consumed (Item 10B) varies from 1/6 hp. to 7½ hp. The estimated costs for operating the heating system vary from 11.9 cents to 13.5 cents, while the operating cost for cooling ranges from 6.75 cents to 46.9 cents per hr.

However, regardless of how one may interpret the detailed figures in the table it is impossible to avoid the conclusion that the practical side of installing an air conditioning plant is not simple. That is, it is not simple if the goal is to get the best and the most air conditioning for the least money. Neither can the conclusion be escaped that even if the equipment itself is perfect, expensive errors can easily be made unless the person who designates how the equipment is to be applied is thoroughly competent. If the owner is to have eventually an installation which fits both his building

and his pocket-book, it seems apparent that he will do best to place his problem in the hands of informed independent engineers. Air conditioning of the kind which our client had in mind is a tailor-made job and a little expert tailoring of the whole installation seems to be definitely in order.

The price range, after making all reasonable adjustments, still varies from $2250 to $5400, and gives an index of what can be spent on this kind of job. Cooling by mechanical means is a $1200 to $1400 item. The rest of the difference is hard to account for, and whether the most expensive installation will really do more than the cheaper ones is something that doesn't appear on the surface. There is no doubt that some apparatus is better built than others, but from evidence available this quality difference may or may not be reflected in the price. Overhead, rate of production, and other intangible items certainly influence the price.

From the point of view of performance, the table gives a fair index of the variety of ways air conditioning may be applied, and also illustrates the confusion between partial air conditioning and complete air conditioning.

Partly as a result of considering this case which our client brought in, and in the light of our further study, it seems to us that some measure or yardstick is badly needed to reduce the various air conditioners to some common denominator. What is wanted is a measure which can be put alongside any air conditioning plan and permit it to be compared with any other one on the basis of what each can or cannot do.

N.B.—In Part II, which will follow in a later issue, the author will suggest a specification based on the one used in the above case but re vamped and improved as his experiences dictate. It is hoped that his specification can be used as a starting point for a yardstick which can measure one conditioner in terms of other conditioners.

Long Range Weather Forecasts Based on Sun Radiation

WEATHER radiates from certain "centers" on the earth's surface. The centers themselves shift position from time to time in accordance with variations in the heat radiation of the sun.

These two findings, dealing with the fundamental mechanics of weather phenomena and potentially of far-reaching significance in meteorological science, have just been announced by H. Helm Clayton, editor of World Weather Records for the Smithsonian Institution.

The surface of the earth derives all its heat from the radiation of the sun. On this basis, it might seem at first thought, the hotter the sun the hotter the earth. So far as anybody knows to the contrary, this would be true if the earth were without water or air, as the moon is. But actually, when the sun's heat radiation increases, as it demonstrably does when the sun spots progress from minimum to maximum number, some parts of the earth are cooler. In fact, both the theory of the eminent British meteorologist Simpson, and statistical investigation by Clayton show that a moderate increase in solar radiation brings a decrease in the mean temperature of a considerable part of the American continent.

This is not quite so paradoxical as it might seem. The temperature of the earth as a whole depends on the amount of heat received from the sun, but the temperature of any given spot at any given time does not depend directly upon the sun's radiation but upon where the air is coming from as well as upon the cloudiness prevailing. These factors in turn depend upon the distribution and opposing movements of masses of warm and cold air—high pressure areas and low pressure areas. The weather of a given spot at a given time depends upon its location with respect to these moving areas.

Mr. Clayton, analyzing the weather map of the world as compiled from the Smithsonian Institution's World Weather Records, succeeds in locating certain areas where changes in pressure, temperature, and rainfall are most intense. From these areas the "highs" and the "lows" move out. They are like big meteorological railroad junctions, from which are dispatched the trains carrying the hot air and the cold air, rain and fair weather, for the adjacent territories.

The existence of such "centers of action," as Mr. Clayton calls them, has been known for a long time. Unfortunately, they have refused to "stay put." A certain area—say the Middle Atlantic States—might belong at one time to the field of action of a certain center and be affected in a certain way. But as centers of action move about such relations change.

Now, after years of research, Mr. Clayton has been able to demonstrate that the complexity has been due to the fact that the centers shift with the intensity of the sun's activity, and with them the territories whose weather they control. This year the Middle Atlantic States are affected in a certain way by the combined influences of several fields of action. Next year these centers may have shifted so that their aggregate influence greatly changes.

As stated, Mr. Clayton's essential contribution is the finding that the shifts are dependent on variations in solar radiation. When the sun gets hotter it may disturb the pressure equilibrium so that a given territory is shifted a thousand miles, resulting in northerly winds replacing southerly ones, causing a station to become cooler. The general effect, in fact, of increased solar radiation is to make the northern hemisphere cooler because, he demonstrates, the tendency of a hotter sun is to shift northward the northern high pressure areas and increase their intensity, so that they have more of a push in sending cold air southward. At the same time the contrary push of the northward moving warm air is weakened.

Air Conditioning Uses and Advantages Studied by Utilities

THERE has been little statistical or factual data on air conditioning up to recent months. Rapid extension of the use of air conditioning has resulted in a situation in which there has been an almost complete absence of reliable information as to the extent of the growth, the places where air conditioning is most popular, just how the installations are being made, operating characteristics of the plants, and many other details.

The fact that the situation existed was well recognized and the desirability of gathering the facts was well known. Means for gathering them were lacking. With the increased attention paid to the subject of air conditioning by the utility companies, certain of the utility organizations have incorporated the collection of statistical and factual data into their plans of promoting its use. A result of this has been the appearance of two books which include very considerable amounts of information showing many items heretofore missing.

One of these is a 292-page planigraphed, paper-bound, illustrated report prepared by Electric Bond & Share Company for the information of its client utility companies. This is in the nature of a private report, has no price set on it, and is not available for general distribution. The other is a publication of 45 pages prepared by the Air Conditioning Sub-committee of the Sales Committee of the Edison Electric Institute, entitled "Air Conditioning, 1934." It is in the usual form of such reports and is priced at 75c. to members and their employes, $1.85 to non-members, and $2.00 to foreign countries.

Both books are alike in that they consider air conditioning from the viewpoint of utility companies who supply power for operation; suggest plans of procedure for such companies; discuss such matters as market potential; include extensive tabulation of factual material gathered from the field. They differ in that the facts presented do not come from the same cities and that the report of the Electric Bond and Share Company is much more comprehensive in its scope than is the pamphlet of the Institute.

Lack of space in this issue prevents including even a condensed summary of all the interesting and important material in either, of attempting to summarize from both reports combined, or of analyzing or fully outlining the material in either. The statistical material in the Institute report is condensed enough, however, so that the tables and comments reprinted herewith include the greater part of this kind of information from the Institute pamphlet.

In its presentation, the sub-committee divided air conditioning into three distinct uses, viz.: industrial, commercial, and personal. It sent out questionnaires intended to bring information on the use, size, and horsepower of each installation, together with other items to attempt to show need for and benefits derived from the installations.

The results of the questionnaire may be summarized as follows:

TOTAL NUMBER OF CLASSIFICATIONS OF AIR CONDITIONING INSTALLATIONS—

Industrial	20
Commercial	26
Personal	3
	49

TOTAL NUMBER OF INSTALLATIONS REPORTED—

Industrial	269
Commercial	1,220
Personal	504
	1,993

TOTAL HORSEPOWER OF CONNECTED LOAD—

Industrial	44,515
Commercial	134,388
Personal	1,383
	180,286

TABLE I—SUMMARY OF INFORMATION ON INDUSTRIAL AIR CONDITIONING

Class of Business	Number of Companies Reporting Installations	Total Number Installations	Total Horsepower	Average Horsepower	Largest Installation	Smallest Installation
Bakeries	10	52	947	18	.....	....
Candy	16	60	6,046	101	520	2.5
Chemicals and Drugs	9	16	2,398	150	540	2
Cooperage	1	2	40	.....	.....	....
Creameries	2	3	43	14	.....	....
Fruit Ripening and Storage	3	5	97	.....	40	3
Citrus Fruit Packing	1	10	1,650	.....	.....	....
Food Specialties (Jello-Pecans)	3	4	34	.....	30	1
Leather Tanning and Mfg.	2	3	503	168	266	....
Meat Packing	5	17	2,395	140	.....	....
Miscellaneous	5	22	627	29	.....	....
Paper Containers	1	1	75	.....	.....	....
Photographic Films	3	6	21,748	3,625	.....	....
Printing and Lithographing	11	31	3,481	112	350	1
Textiles	5	20	2,151	108	1,000	25
Tobacco and Cigar	4	12	943	79	.....	....
Telephone Cable	2	2	1,153	577	1,085	68
Cork Products	1	1	104	.....	.....	....
Sugar Storage	1	1	(Not Given)	.....	.....	....
Oil Testing	1	1	80	.....	.....	....

TABLE II—SUMMARY OF INFORMATION ON COMMERCIAL AIR CONDITIONING

Class of Business	Number of Companies Reporting Installations	Total Number Installations	Total Horsepower	Average Horsepower	Largest Installation	Smallest Installation	
Banks	13	47	5,058	107	.....	..	
Beauty and Barber Shops	6	8	78	10	30	..	1 Barber Shop, 30 Horsepower
Broadcasting Stations	8	13	852	66	150	..	
Brokers Board Rooms and Exchanges	4	12	956	80	.....	..	
Business Offices	4	12	599	50	435*	3	* Nat'l Geographic Office
Clubs and Apartments	3	9	410	45	.....	..	
Churches	4	7	183	26	48	10	
Depots	1	2	23	...	.....	..	
Florists	1	1	3	...	.....	..	
Funeral Chapels	18	38	284	8	21	..	
Halls	5	14	1,111	80	445	..	
Hospitals	7	19	1,155	60	706	..	
Hotels	14	72	9,951	138	.....	..	
Libraries and Museums	5	7	511	73	327	1	
Miscellaneous	2	6	130	22	50*	..	* Research Laboratory
Medical Offices	10	17	258	...	225*	..	* Apparently a Professional Building
Office Buildings	9	105	12,692	121	2,275	..	
Public Buildings	3	38	14,476	...	.....	..	Includes 24 U. S. Gov't Bldgs. at Washington
Recreation Center	1	1	3	...	.....	..	
Restaurants	24	248	7,328	30	.....	..	Part of "Hotel" Class. Is Comprised of Restaurants
Sales and Display Rooms	7	28	235	8	80	..	
Schools	4	19	264	14	.....	..	
Shoe Repair Shops	1	3	7	...	.....	..	
Stores (Department)	17	44	11,771	268	.....	..	
Stores and Shops (Small)	21	149	1,827	12	.....	..	
Theatres	24	301	64,223	213	.....	..	

Number of companies replying to air conditioning questionnaire	26
Number of questionnaires mailed out	32
Metropolitan population of communities served by companies answering (approximately)	20,000,000

The questionnaire also supplied information from which Tables I, II, and III were prepared. These three tables give the essential items whereby the relative importance and present status of the three classes of conditioning can be judged. The relatively large horsepower of the 300 theaters is well shown, as is the predominance of restaurants and small stores in the number of installations of commercial conditioning. Surprisingly small is the total number of homes and private offices reported.

TABLE III—PERSONAL CLASSIFICATION

	Homes (Total)	Homes (Partial)	Private Offices
No. of companies reporting installations	8	22	20
Total No. of installations	14	265	225
Total horsepower	92	507	784
Average horsepower	6.5	1.9	3.5
Equipped with central plants	12	54	13
Equipped with cooling units	2	211	212

Comments of the committee as to the facts brought out by these three tables are to the point, and are as follows:

Uses and Advantages of Air Conditioning for Industrial Purposes

Table I shows 20 classifications of industrial air conditioning. A total of 269 installations are reported, with 44,515 hp. of connected electric load. With the exception of candy manufacturing, baking, chemicals and printing and lithography, this list is made up of industries in which very few of the reporting companies have air conditioning.

To a certain extent, this is unavoidable, as some of the largest industrial users of air conditioning are sectional, with few cities having factories of the particular kind. The manufacture of telephone cable, for example, is only carried on, to any great extent, in Hawthorne, Ill., and Baltimore, Md. Other cities have no opportunity for this class of air conditioning. The same principle is true, more or less, of such sectional industries as tobacco manufacture, production of photographic film, textiles, etc.

In some industrial operations, such as textiles, tobacco, drugs, etc., certain forms of air conditioning are practically a necessity. Definite humidity or temperature conditions have to be maintained in order to make a product. The penalty for not providing air conditioning is so large in spoilage, lost time, inferior product, and slowed-up production that such manufacturers have come to regard air conditioning an essential feature of their factory equipment.

There are other manufacturing processes, however, where air conditioning is not vitally necessary, but where its benefits are great enough to well justify its installation. The following is an illustration:

A meat packing establishment decided to condition the air in the room where meats from the smoke house are processed and packed. By maintaining controlled temperature with high relative humidity, loss of weight was eliminated; the meats retained their moisture and did not shrivel or wrinkle. The finished product had a better appearance, weighed more, and was more salable.

Uses and Advantages of Air Conditioning for Commercial Purposes

Table II shows 26 classifications of commercial air conditioning, with a total of 1,220 installations reported, and a total connected electric load amounting to 134,388 hp. The bulk of this business is concentrated in a few fields; viz., theaters, restaurants, department stores, hotels, office, and public buildings. Of these, theaters and restaurants are ordinarily completely air conditioned. The others, however, such as department stores, hotels, and office buildings, are only partially air conditioned. Certain floors, or departments, may be thus equipped while the remainder of the building is unimproved.

The comfort factor, with its effectiveness in attracting customers and in promoting a more receptive buying attitude, is the central advantage of almost every commercial air conditioning installation. The ramifications of this feature are many, including such points as advertising value, prestige, competitive advantage, etc.

Uses and Advantages of Air Conditioning for Personal Uses

Because of the small size of the installations in this group, and the fact that there are many agencies engaged in the sale of various standard air conditioning and room cooling units, it is probable that the figures given in Table III are not complete. Unless a thorough canvass of the territory is maintained, installations of this kind are apt to escape the attention of the utility company.

Comfort, the alleviation of certain diseases such as hay fever and asthma, and relief for the aged or sick, are the principal reasons for the use of air conditioning in residences. The first two points are also the important factors in private office installations, together with cleanliness and the elimination of noise. Human comfort, health, cleanliness, and pride of ownership are the arguments that appeal in this field.

The rapid progress which manufacturers have made in developing unit equipment for single rooms, combined with the publicity which is being given air conditioning, is attracting the attention and the interest of a rapidly growing number of people. One indication of this is the increase in the number of personal installations made during 1933.

Despite the fact that the average horsepower is small, personal air conditioning is a field of tremendous potential possibilities for the electric utility. To the man of average means, home comfort and health are matters of large importance, and the investment in home improvements and modern facilities to obtain this objective is relatively large. It is usually made with a willingness and interest that is partly due to pride of ownership and partly the desire for a continually bettered standard of living.

The installation cost is the chief handicap just at present, but even this should be no obstacle with thousands who can well afford to air condition certain rooms or the home in its entirety. Of equal significance, as a sales resistance, is the feeling that air conditioning for the home is still in its experimental stages. The average prospect believes that it will be a practical thing in the future, but that the various types of cooling units and systems now on the market are still in the developmental period and that they will be superseded by methods that are better, less expensive, and more economical to operate. In the meantime, many hesitate, because of the cost, to adopt this improvement.

Air conditioning equipment, as it exists today, includes no new or untried principles, but is rather an adaptation of many methods of long practice by different industrial groups to achieve a new result.

This is a well-recognized stage in the progress of a new machine, and every invention has had to undergo such a period, as witness the history of the automobile, the radio, electric refrigeration, etc.

The problem calls for extensive publicity, educational advertising, and personal sales work. The convenience and ease of conditioning part of a home—living room, sleeping quarters, for example — with equipment that will produce dependable results is a feature that will induce many to initiate this improvement. The health factors, relief for sick or bed-ridden, are also points that deserve to be vigorously pushed.

Uses of conditioning and the benefits resulting are also listed in the report in the following fashion:

Industrial Uses

A summary of the uses in each of the industrial classes is as follows:

Bakeries: Used in dough rooms and proofing rooms, to give better product and uniform, controlled production. (Washington, Chicago, San Francisco.)

Manufacturer of fancy cakes greatly reduced his manufacturing time, cut cost and improved product. (New Orleans.)

For cooling mixing room and cooling bread after baking. (St. Louis.)

Candy: Prevents losses of product, spoilage, and insures uniformity and increased production. (New Orleans.)

Facilitates hardening—cleanliness in wrapping—employee efficiency. (Chicago, Pittsburgh.)

Special conditions for coating candied nuts, etc. (St. Louis.)

Quick hardening of chocolate and preservation of candy during summer. (Washington.)

Enables firm to manufacture chocolates in summer, when such plants are ordinarily closed down. Air conditioning used in starch rooms, enrobing or coating rooms, storage and packing, and also in company offices. (Baltimore.)

Chemicals and Drugs: Manufacturers of hygroscopic chemicals or drugs have to maintain fixed conditions of humidity to prevent spoilage of product. Variety of products—Bromo Seltzer, photographic emulsions, serums, etc. (St. Louis, Rochester, New York, Omaha, Baltimore.)

Creameries: For cooling in butter wrapping room. (St. Louis.)

Maintain suitable working conditions. (Denver.)

Cleaned air also should be a factor in preventing contamination.

Fruit Ripening: Used in rooms for ripening bananas, to reduce spoilage and control the ripening period. (Boston, New Orleans.)

Food Specialties: Manufacturer of Jello uses dehumidification. (Cincinnati.)

Producer of shelled pecans requires low humidity for protection against spoilage losses and to improve quality of product. (New Orleans.)

Leather: Tannery uses air conditioning in hide storage cellars. (St. Louis.)

Meat Packing: Improves sausage product. (Washington.)

For processing hams and sausage—high humidity. (Rochester.)

Prevents shrinkage and loss of weight; gives improved appearance to product. (Baltimore.)

Miscellaneous: Mushroom grower has a 30-hp. installation to maintain 70° and 70% relative humidity. (Denver.)

Curing room for cement testing is equipped with air conditioning to provide 70° and 98% relative humidity. (Denver.)

Malt manufacturer uses air conditioning. (Chicago.)

Possibility of use in rooms devoted to wine and beer storage, as it is suggested that humidity and purity of air, as well as temperature, affect the quality of the product.

Photographic Film: Large installations at Rochester in connection with the manufacture of photographic film and positive papers. To set emulsion and to insure clean air at constant conditions for process cooling.

Printing and Lithography: Facilitates production and improves quality through drying of ink; elimination of static; removal of dirt; removal of heat from type melting. (Chicago.)

Maintains proper humidity for accurate lithographic reproduction. (Cincinnati, New Orleans.)

Humidification and air circulation for elimination of static electricity. (Washington.)

Controlled humidity to prevent paper stretching and shrinking—to insure register. (Rochester.)

To prevent expansion and shrinkage of wooden blocks on which engravings are mounted. Insures accurate reproductions in technical publications. (Baltimore.)

Textiles: Manufacturer using rayon yarns employs air conditioning to prevent stretching of threads. Rayon very sensitive to humidity. Eliminates seconds and spoiled merchandise. Before installation it was impossible to manufacture during summer. (Philadelphia.)

Manufacturer of cotton products maintains 45% relative humidity. (Texas.)

Silk manufacturer maintains 75% to 80% relative humidity (no temperature control) facilitates production and insures better quality of product. (Chicago.)

Tobacco and Cigars: Control of curing and process. Permits working tobacco regardless of weather. Better and more uniform product. Increased efficiency and reduction of lost time on part of employes. (Philadelphia.)

Improved working of tobacco and special processing to improve quality. (New Orleans.)

Telephone Cable: Maintaining extremely low humidity in rooms where cable is covered to eliminate any trace of moisture in finished cable. (Baltimore, Chicago.)

Cork Products: Bottle cap manufacturer uses air conditioning in rooms where specially prepared sticks of granulated cork are handled. Prevents binder from softening. (Baltimore.)

Sugar Storage: Storage losses reduced and product improved. (New Orleans.)

Fruit Storage: Enables producer to hold stock for satisfactory market conditions. Citrous fruit storage.

Rayon Manufacturer: Air conditioning is used throughout factory engaged in making rayon. Practically all of the air that comes in contact with the production in its various stages is air conditioned. Conditions vary in different rooms, ranging from 63% to 97% relative humidity and from 63° to 75°.

Commercial Uses

Banks: For comfort of patrons and comfort and health of personnel. A prestige factor—to attract customers—to promote working efficiency. One bank has an installation in vault to prevent corrosion. (Cincinnati.)

Beauty and Barber Shops: Advertising value and comfort factor to attract customers.

Broadcasting Stations: Better performances under more comfortable conditions. (Chicago.)

Brokers Board Rooms and Exchanges: Comfort, cleanliness and efficiency, and attracts business. (Chicago.)

TABLE IV—FACTUAL DATA ON SUMMER AIR CONDITIONING, RESIDENTIAL INSTALLATIONS

Location	Ref. No.	Date of Installation	Floor Area Sq Ft	Volume Cu Ft	Max. Heat Load Btu per Hr	No. of Rooms Cooled	No. of Occupants	Inside Conditions Maintained	% of Outside Air	Compressor Hp	Total Hp	Annual Kwhr	Hr Air Cond. Used per Yr	Mos. Air Cond. Used per Yr	Reason for Installing Air Conditioning
Chattanooga, Tenn.	10	Apr., 1932	260	2,600	10,000	1	2	10° T. D.	0	1.5	1.5	2,700**	2,800	6	Heat Relief
St. Louis, Mo.	36	June, 1932	320	2,560	12,000	1	4	80° 50%	0	1.5	1.6	1,200	800	4	
Clayton, Mo.	38	July, 1929	593	7,265	18,000	1	5	78° 45%	15	3	3.5	3,900	2,400	5	
Philadelphia, Pa.	49	1933	340	3,400	10,500	1	2	15° T. D. 50% R. H.	0	1.5	1.6	1,200*	1,200	5	
Baltimore, Md.	74	June, 1932	332	3,650	14,000	1	2	80° 50%	0	1.5	1.5	500***	500	4	
New Orleans, La.	75	June, 1930	210	2,100	9,500	1	2	10° T. D.	0	1.5	1.5	2,457	1,630	6	Hay Fever Relief
New Orleans, La.	76	June, 1932	300	3,000	11,500	1	4	10° T. D.	0	1.5	1.5	1,386	924	6	Comfort
Newark, N. J.	85	May, 1933	300	2,400	11,000	1	2	10°–15° T. D.	0	1.5	1.5	488*	325	3	
Philadelphia, Pa.	47	1933	381	4,191	17,300	2	2	15° T. D. 50% R. H.	0	2	2.1	15,00*	1,100	5	Relief of Allergic Disorders
Baltimore, Md.	72	June, 1933	300	3,000	24,000	2	3	80° 50%	0	1.5	1.5	1,000*	1,000	4	Comfort and Health for Infant
Englewood, N. J.	87	July, 1933	527	4,218	12,497	2	3	70° DB 40%	0	1.5	1.5	488*	325	3	
Detroit, Mich.	98	June, 1933	237	2,014	12,000	2	2	10° T. D.	0	1.5	1.6	344*	225	3	Comfort
Nashville, Tenn.	9	Aug., 1933	768	7,680	36,000	3	4	10° T. D.	0	3	3.5	6,000*	2,880	5	Comfort Cooling and Hay Fever
Stockton, Calif.	30	May, 1933	425	3,400	12,000	3	3	12°–15° T. D.	10–15	1.5	1.5	2,000*	1,500	3.5	Saves Long Summer Vacation
St. Louis, Mo.	37	June, 1932	1,000	8,500	30,000	3	6	80° 50%	0	3	3.25	3,000	1,000	4	
Philadelphia, Pa.	48	1933	1,050	9,450	32,000	3	6	15° T. D. 50% R. H.	0	3	3.3	4,800*	2,000	5	
Baltimore, Md.	73	June, 1932	800	8,000	55,000	3	6	80° 50%	0	5	5.75	3,500	1,000	4	Comfort Cooling
New Orleans, La.	77	Nov., 1933	3,460	39,800	40,000	6	6	10° T.D.	0	5	6	6,000*	1,000	6	Comfort

*Installed summer of 1933. Consumption estimated. **Est'd. Apparently high. ***Est'd. Apparently low.

TABLE V—FACTUAL DATA ON SUMMER AIR CONDITIONING, COMMERCIAL INSTALLATIONS

Location	Ref. No.	Date of Installation	Floor Area Sq Ft	Volume Cu Ft	Max. Heat Load Btu per Hr	Capacity	Inside Conditions Maintained	Compressor Hp	Total Hp	% Outside Air	Annual Kwhr	Hr Air Cond. Used per Yr	Mo Air Cond. Used per Yr	Reason for Installing Air Conditioning
Stores														
Flint, Mich.	15	July, 1933	496	4,496	22,000		10° T. D.	2	2.5	0	2,680*	1,500	4	More efficient employees
Montgomery, Ala.	26	1929	13,500	270,000	540,000	40 occupants	10° T. D.	75	120	30%	64,000*	800	5	
Sacramento, Cal.	29	July, 1933	1,800	20,400	60,000	12 "	72°	5	6	15%	3,600*	800	4	Inc. rev., more eff. employees
St. Louis, Mo.	33	May, 1932	2,030	22,330	72,000	38 "	80° F. 50% R. H.	7.5	8	0	7,200*	1,250	5	Inc. patronage—good will
St. Louis, Mo.	34	June, 1933	1,110	16,700	52,000	250 "	80° F. 50% R. H.	5	5.25	0	4,500*	1,200	5	
St. Louis, Mo.	35	May, 1933	1,765	28,000	60,000	40 "	80° F. 50% R. H.	6	6.5	20%	6,000*	1,250	5	
Philadelphia, Pa.	45	1931	12,600	169,600	840,000	128 "	15° T. D. 50% R. H.	100	135		143,000	2,000	6	More efficient employees
Baltimore, Md.	71	June, 1933		15,000	70,000	30 "	80° 50%	7.5	7.5	0	7,500*	1,500	4	More eff. employees, inc. patronage—good will
New Orleans, La.	78	May, 1933	164,000	2,600,000	5,400,000		82° 45%	500	720	40%	448,000	1,200	6	
Newark, N. J.	84	July, 1933	11,270	129,600	582,000	112 "	80° 50%	60	80.25	55%	68,000*	2,400	12	
Trenton, N. J.	86	June, 1933	460	4,140	20,000	18 "	8°–12° T. D.	2	2	0	1,080*	720	4	Inc. rev., max. empl. efficiency
East Orange, N. J.	88	May, 1933	1,770	24,830	121,680	60 "	80° D. B.–68° W. B.	11	11	40%	7,600	900	3	Inc. patronage—good will
Detroit, Mich.	94	May, 1933	1,850	23,800	69,000	35 "	13° T. D.	7.5	7.9	0	8,041	1,150	5	Ditto
Detroit, Mich.	96	1925	472,000	7,820,000	22,200,000		15° T. D. 55% R. H.	850		25%	1,200,000	3,840	12	Ditto
Omaha, Neb.	100	May, 1933	5,500	77,000	228,000	300 "	75° D. B. 50%	25	26	0	22,500	960	3	Increased patronage
														In. rev., max. empl. eff.
														Inc. patronage—good will
Private Offices														
Youngstown, O.	3	Nov., 1933	560	7,000	21,000	15 "	Vary with outside	3	3.1	25%	5,379			
Akron, Ohio	4	June, 1933	288	2,448	10,152	3 "	10° T. D.	1.5	1.5	0	3,423*	670	5	More eff. employees
Chattanooga, Tenn.	7	Apr., 1933	900	9,000	34,000	10 "	10°–15° T. D.	3	3.1	0	6,000*	1,800	6	" " "
Flint, Mich.	16	Nov., 1933	700	7,000	30,000	3 rooms	7° T. D.	3	3.34	0	1,500*	480	3	
Jackson, Mich.	17	Sept., 1933	800	8,000	30,000	3 "	7° T. D.	3	3.5	0–100%	1,500*	480	3	Ditto. Hay Fever Relief
Kalamazoo, Mich.	18	Nov., 1933	500	5,000	28,000	2 "	10° T. D.	3	3.34	0	1,500*	480	3	
Battle Creek, Mich.	19	Nov., 1933	500	5,000	27,000	2 "	10° T. D.	3	3.34	0	1,500*	480	3	
Baltimore, Md.	68	July, 1933	1,400	20,000	43,000	12 occupants	78° 50%	6	6	0	4,000*	1,200	5	
New Orleans, La.	79	July, 1932	300	3,000	11,500	2 "	82° 50%	1.5	1.6	0	1,158	900	6	Rel. from Hay Fever—good will
Omaha, Neb.	101	July, 1931	2,600	36,000	72,000	35 "	80° 50%	7.5	8.5	0	7,300	960	3	Max. empl. efficiency
Omaha, Neb.	102	July, 1933	1,600	13,600	48,000	15 "	80° 50%	5	6	20%	5,200*	960	3	" " "
Theaters														
Atlanta, Ga.	12	Nov., 1929	20,000	1,600,000	3,144,000	5,000 seats	12° T. D. 55% R. H.	500	672	20% Min 100%	225,000	1,200	4.5	Inc. patronage—good will
Atlanta, Ga.	13	Apr., 1926	12,750	1,147,000	2,100,000	2,440 "	76° D. B. 60° W. B.	200	306	15%	170,000	1,500	5	25% inc. patronage—good will
Montgomery, Ala.	25	1929	10,000	50,000	1,370,000	1,628 "	72° D. B. 58% R. H.	100	150	40%	125,000*	1,500	5	
Mobile, Ala.	27	Jan., 1927	14,000	910,000	2,000,000	2,665 "	10° T. D.	200	299	40%	240,000	1,800	6	
Philadelphia, Pa.	42	1930	26,000	780,000	1,500,000	2,500 "	15° T. D. 48% R. H.	225	283		75,400	1,500	4	Inc. patronage and good will.
Baltimore, Md.	67	May, 1933	2,400	60,000	400,000	800 "	80° T. D. 50% R. H.	25	34	20%	28,000*	2,000	12	Inc. rev.—increased patronage
Restaurants														
Nashville, Tenn.	8	May, 1933	4,400	39,600	200,000	300 "	12° T. D.	20	22.5	2,000 Cfm	43,200*	2,160	6	Increased revenue
Sacramento, Cal.	31	July, 1933	2,500	25,000	80,000	82 "	70% R. H.	7.5	8	0	7,200*	1,200	4	100%; more eff. empl.
St. Louis, Mo.	39	Apr., 1932	1,520	16,740	120,000	100 "	80° F 50% R. H.	15	17	25%	10,000*	1,200	5	Inc. patronage Increased revenue, inc. patronage and good will
Philadelphia, Pa.	44	1930	7,200	86,400	600,000	352 "	15° T. D. 50% R. H.	60	140		146,000	3,000	6	Good will
Baltimore, Md.	70	July, 1933	2,176	30,500	134,000	100 "	80° 50%	9	11	20%	6,000*	1,000	4	Inc. rev., inc. patronage, good will
Newark, N. J.	83	July, 1932	2,470	29,900	127,000	125 seats	80° 50%	15	19	36%	5,030*	600	3	Inc. patronage, inc. revenue
Elizabeth, N. J.	89	June, 1933	600	4,000	60,000	42 "	80° 50%	4.5	5	20%	6,000	1,500	4	Inc. patronage, inc. rev., max. empl. eff., good will
Omaha, Neb.	99	June, 1933	9,000	80,000	372,000	250 "	77° D. B. 50%	40	45	30%	38,880	800	3	Ditto
Omaha, Neb.	103	June, 1931	2,140	30,000	90,000	150 "	80° 50%	10	11	0	9,600	960	3	Ditto
Omaha, Neb.	104	June, 1932	1,600	22,000	144,000	125 "	77° 50%	15	16	30%	13,000	960	3	Ditto
Office Buildings														
St. Louis, Mo.	41	Oct., 1931	125,000	1,578,125	2,640,000	1500 occupants	82° F 50%	250	338	20%	271,000	1,253	12	
Philadelphia, Pa.	43	1932	380,000	4,180,000	13,200,000	33 floors		1,400	2,340		1,632,000	1,500	5	Inc. patronage and good will
Oklahoma City, Ok.	50	June, 1933	2,580	31,500	116,000	100 occupants	80° D. B. 45% R. H.	11.5	15	25%	13,000*	1,500	5	More eff. empl.—good will
New Orleans, La.	82	June, 1933	123,000	1,400,000	4,200,000	22 floors	80° 45%	400	516	30%	360,000			Inc. patronage and good will
Funeral Homes														
Sacramento, Cal.	32	July, 1933	4,000	72,000	35,000	100 seats		3	3.5	0	1,170*	450	6	More eff. employees
St. Louis, Mo.	40	July, 1932	5,150	61,200	210,000	480 occup.	80° F 50% R. H.	21	23	25%	14,000*	1,250	6	Inc. patronage and good will
Union City, N. J.	90	Aug., 1933	1,600	16,000	46,000	100 persons	10° F T. D.	10	12	20%	5,500*	450	8	Inc. patronage and good will

*Consumption estimated.

Business Offices: Increased efficiency, improved health, cleanliness, elimination of noise, reduction in loss of time through sickness.

Clubs and Apartments: Eliminates seasonal slump in patronage. Apartment house conditioned the upper floor apartment, with three rooms supplied from a 1-ton compressor placed under kitchen sink. Direct expansion coils and fan were mounted on shelf of a closet which adjoined the three rooms. Supply grilles led to each room and by means of a shutter arrangement conditioned air may be supplied to each room as it is occupied. Low first cost and low operating cost. (Chicago.)

Churches: Larger attendance in hot weather.

Funeral Chapels: Good-will and prestige factor. Attracts clients by providing better surroundings and comfort during services.

Halls: A factor in renting halls and auditoriums for meetings in hot weather.

Hospitals: For operating rooms—comfort for surgeon, elimination of noise, and enhanced cleanliness.

Special rooms for treatment of pneumonia and other pulmonary diseases. Relief for sufferers from hay fever and asthma.

Hotels: Practically all installations are in hotel restaurants, meeting halls, barber shops or special suites. No completely air conditioned hotels.

One hotel installed air conditioning in refuse rooms to prevent odors which would be offensive to guests. (Washington.)

One hotel has a special air conditioned suite for which extra charge is made. Always in high demand. (Pittsburgh.)

Libraries and Museums: To control humidity and eliminate dust and dirt as a factor in preserving books and other exhibits. Also provides improved comfort and health conditions for personnel and visitors. (Baltimore.)

Private collector equipped room to protect his collection of first editions. Humidity control. (Baltimore.)

TABLE VI—FACTUAL DATA ON SUMMER AIR CONDITIONING, INDUSTRIAL INSTALLATIONS

Questionnaire Sheet Number	Type of Business	Date of Installation	Floor Area Sq Ft	Volume Cu Ft	Summer Max Heat Load Btu per Hour	Units of Product mfgd. Per Day	Inside Conditions Maintained	Per Cent of Outside Air	Compressor Hp	Total Hp	Annual Kwhr	No. Hrs. Air Cond. Per Year	No. Mos. Air Cond. Per Year	Reason for Installing Air Conditioning
5	Candy Factory	Sept., 1932	195	1,755	10,094		20° T. D.	0	2	2	4,752	1,272	12	Dipping and storage of candies. Inc. revenue production and better product
6	Mushroom Growing	July, 1933	990	11,880	49,000		54°	3. ch/hr	5	6 2	6,900	1,500	5	Inc. rev. Better product. Inc. production
14	Laboratory	Apr., 1933	810	5,607	25,000		42°	0			8,000	3,000	12	
28	Hosiery Mills		40,000	428,000		No refrign. equipt. instld.								
46	Cigar Factory	1929	10,000	150,000	1,260,000	664,000 cigars	78° D. B. 70% R. H.		150	250	580,000	8,760	12	Reduced lost time of employees. Reduced labor turnover
63	Poultry Feed Room	Aug., 1933	8,250	132,000		1,334 lbs. poultry per day			7.5	8.5				No data
66	Meat Packing	Mar., 1933	5,040	55,440	812,000	65,000 lbs. meat	65° D. B. 70% R. H.	12	30	52.5	132,500	3,800	12	Est. saving in wt. on shrinkage $900 per week. Better product
81	Cracker Factory	Dec., 1931	3	300	72,000	Variable	50° D. B. 35% R. H.	0	10	12		2,400	12	Reduced processing time from 24 hrs. to 5 min.

Miscellaneous: Research laboratory—to reduce dirt and provide working comfort. (Detroit.)

Medical Offices: Improved personal efficiency; relief for patients. (New Orleans.)

Office Buildings: Important from office rental viewpoint. Second floor of a 23-story office building had been untenanted for six years, due to the dirt and noise nuisance of mid-city section. Floor area of 15,000 sq. ft. was treated with double glazing and a 30-ton cooling plant. Temperature and humidity conditions provide ideal working quarters. Dust and dirt eliminated and exterior noises pass unnoticed. Space converted into a profitable, income-producing unit. (Chicago.)

Restaurants: Increased patronage and increase in average sale in hot weather.

Sales and Display Rooms: Department store installed air conditioning in a specially constructed room in which their mid-summer fur sale was conducted. Advertising value and more suitable conditions for selection of merchandise. (Baltimore.)

Shoe Repair Shops: Small shoe repair shop, located in crowded, downtown district, installed two 1½-hp. cooling units. These proved so successful that the same owner placed orders for similar equipment for two other shoe repair shops. (St. Louis.)

Department Stores: Prestige, advertising and goodwill value. Attracts larger patronage in weather when business ordinarily falls off. Because of comfortable shopping conditions, purchases are larger. Increased efficiency of employes. Saving of merchandise from dirt and perspiration in handling.

Theaters: Practically a necessity with present competition and public demand for comfort during diversion. Eliminates summer slump in theater patronage, and during excessively disagreeable weather produces above-the-average attendance because of number of people who go to escape the heat.

General: Sales arguments used to interest commercial prospects:

1. Business building through human comfort.
2. Modernization of buildings.
3. Improved health and working conditions.
4. Improved employe efficiency.
5. Economy.

(New Orleans.)

It is evident that this material with its reference to specific cases can be used as a basis for building up arguments why similar projects should be initiated elsewhere.

Further assistance can be drawn from the tabulated factual information (Tables IV, V, VI and summary tables) included in the report. The data are believed by the sub-committee to be representative, although the difficulty of attempting to obtain definite figures for the entire country or for particular classes of usage was recognized. Even in the present state of development of such information, there is little doubt that considerable valuable information can be gleaned from the facts included in the table. The committee recommended that additional material of this kind be collected as rapidly as practicable.

Under a section of the report dealing with Sales and Promotion Methods, the matter of the kinds of dealers handling air conditioning equipment is discussed by the sub-committee in the following language:

Among the classes of dealers handling air condition-

(Continued on page 74)

SUMMARY OF FACTUAL DATA FOR SPECIFIC USES OF SUMMER AIR CONDITIONING EQUIPMENT

COMMERCIAL

1. Total number of installations reported 67
   Installed in 1933 38
   Installed prior to 1933 29
   Installations reported with complete data 49
2. Averages are given by classes of businesses, using only installations reporting complete data.

Averages

Business	No. of Installations Reported	Maximum Heat Load Btu per Hr: Per Sq Ft Floor Area	Per Cu Ft Volume	Per Hp Compressor	Floor Area Sq Ft per Compressor Hp	Annual Kwh per Total Hp	Months: Hrs per Yr Air Cond. Used	per Yr Air Cond. Used	Aux. Hp per Compressor Hp
Stores	15	43.9	2.7	11,370	259	697.0	1,430	5.5	0.40
Private Offices	11	34.0	3 1	8,980	257	889	841	4.0	0.10
Theatres	6	123.9	2 3	8,410	68	494	1,590	6.2	0.40
Restaurants	10	57.4	5 3	10,000	175	966	1,338	4.1	0.53
Office Bldgs.	4	32.0	2.8	9,780	306	710	1,418	7.3	0.56
Funeral Homes	3	27.1	2.0	8,560	316	538	717	6.7	0.13
Non-Weighted Total Averages		53.2	3.03	8,183	232	716	1,222	5.6	0.35

3. This data is gathered from only a few representative installations in the various localities.

SUMMARY OF FACTUAL DATA FOR SPECIFIC USES OF SUMMER AIR CONDITIONING EQUIPMENT

RESIDENTIAL

1. Total number of installations reported. 27
   Installed in 1933 19
   Installed prior to 1933 8
2. From the Questionnaire replies the Air Conditioning tonnage seemed to be so variable that it is considered best to omit this from the report, especially since the hp data is given.
3. Taking averages:
   Maximum Heat Load Btu per sq ft floor area 31.5
   Maximum Heat Load Btu per cu ft of volume 3.14
   Maximum Heat Load Btu per refrigeration hp 9,070
   Number of rooms per installation. 2.0
   Number of occupants per room ... 1.7
   Refrigeration hp installed per installation 2.3
   Refrigeration hp installed per room 1.1
   Average number of hours Air Conditioning is used per year 1,260
   Average number of months Air Conditioning is used per year .. 4.5
4. Little variation is to be noted on the inside conditions to be maintained. A 10° F temperature differential seems to be the figure most generally used. Next in general acceptance is an inside Dry Bulb temperature of 80° F with a 50 per cent relative humidity.
5. Only ten of the twenty-seven made reply to the "Reason for installing Air Conditioning." Four of these ten were installed for the relief of Hay Fever. The others were for various reasons.
6. This data is gathered from only a few representative installations in the various localities.

Heating and Ventilating

MODERNIZING

A monthly section for promoting the interests of engineers and contractors in the modernizing and renovizing of heating, ventilating, and air conditioning plants in buildings.

AIR CONDITIONING IN MIDWEST OFFICE IMPROVES EMPLOYE EFFICIENCY 30

How Goldblatt Brothers, Chicago, equipped their office with air conditioning to improve working conditions and raise the output of their office employes.

ONLY 27% OF URBAN HOMES HAVE CENTRAL HEATING 32

Analysis of returns for 42 cities covered by the Real Property Inventory showing the type of heating and fuel used in homes throughout the country.

WHAT WILL I USE FOR MONEY? Part 3—DEFERRED PAYMENT PLANS 33

The building owner who desires to modernize can usually do so. The third part of this series discusses the case of the owner who cannot get a direct loan because of insufficient security.

NATIONAL HOUSING ACT PASSED AND APPROVED 35

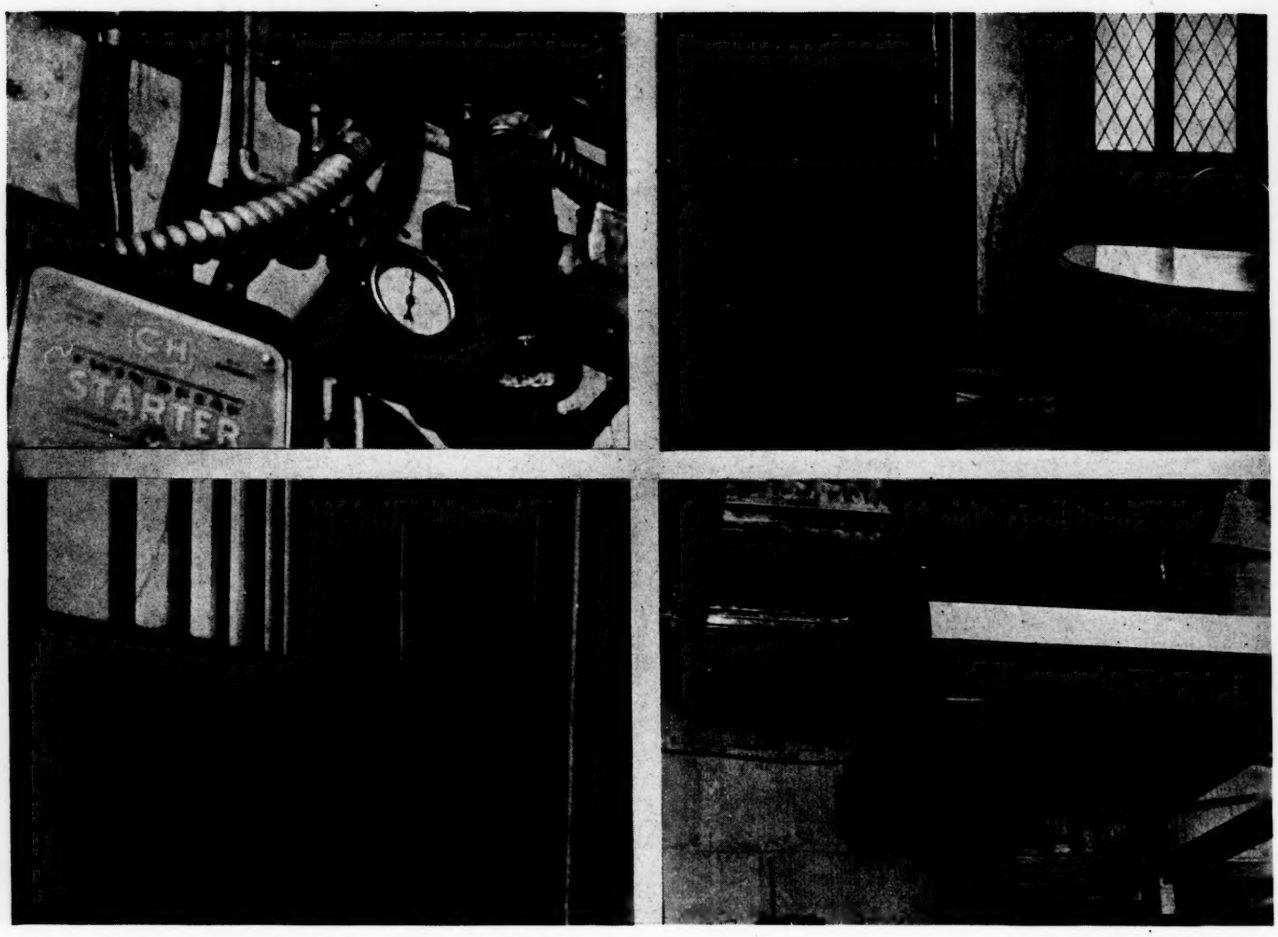
Details and developments of the act passed by Congress to encourage home modernizing, insure housing mortgages, and to establish private mortgage associations.

CINCINNATI STORE MODERNIZES WITH AIR CONDITIONING 36

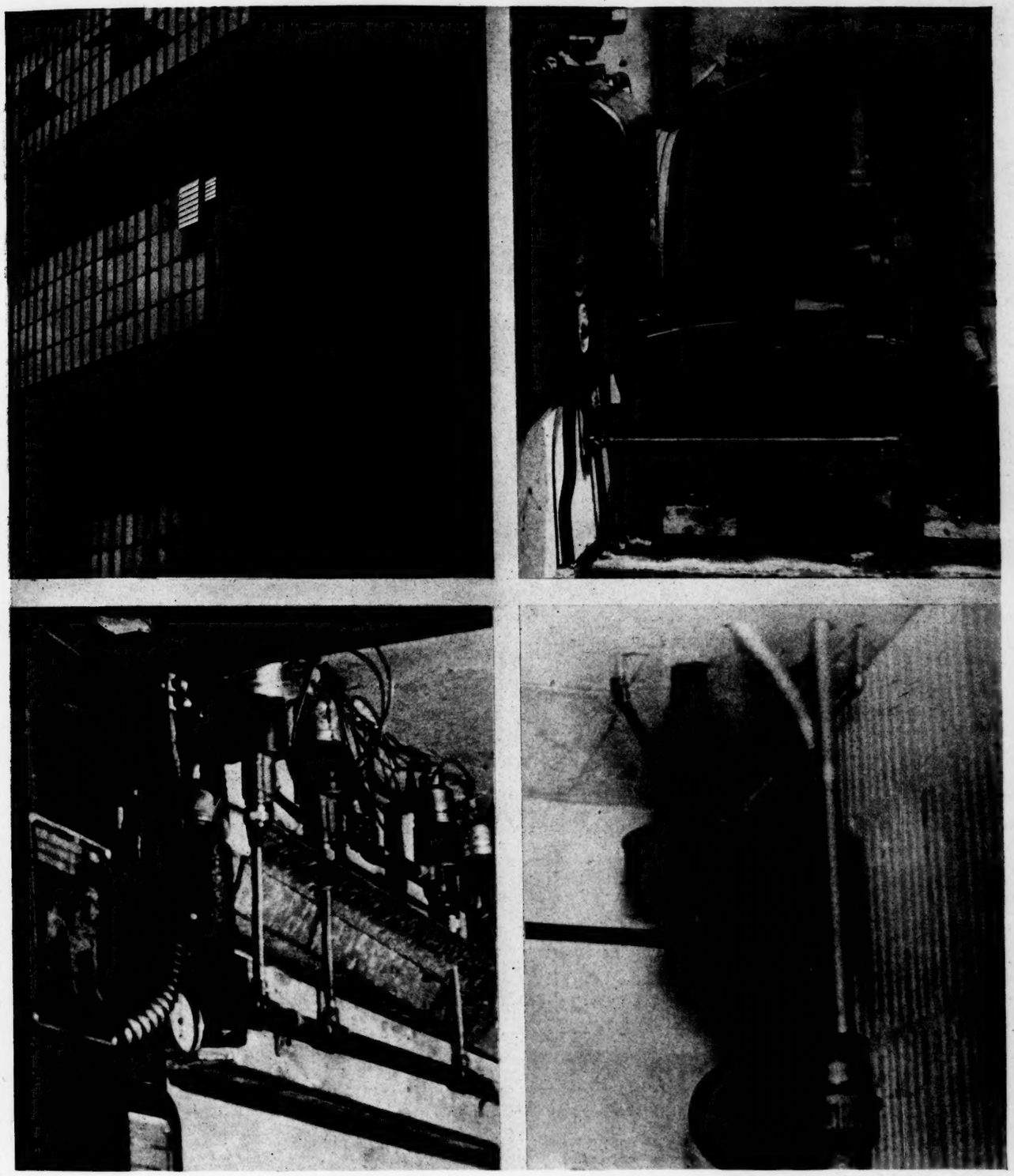
The John Shillito Company department store finds that its $100 thousand investment in air conditioning brings a definite return in added sales volume. Details of the air conditioning system.

Midwest Office Invests in Conditioning to Improve Efficiency of Employees

Views of the air conditioning system in the offices of Goldblatt Brothers, Chicago, which has been installed in the company's plant. Refrigerating equipment is located in a closet, while a suspended ceiling conceals other equipment. Supply fan delivers 4800 c.f.m. while a 3600 c.f.m. exhaust fan operates when cooling units are in service. Two rows of throw-away-type filters are used. Modern grilles are the only visible equipment in each room. System installed by the National Korectaire Co., Chicago.



(Upper left) Close-up of main refrigerating valve. (Upper right) View of one of the executive offices. The walls are of brightly finished panels. (Lower left) The space between the outside wall of the second floor and the wall of the offices in which the windows are placed. By having the double wall attractive offices can be laid out with much of the old but necessary equipment hidden. (Lower right) The exhaust fan was suspended from the ceiling with cork blocks under the tie rods as shown to cushion the vibration. Canvas connections are used to the duct. The clean-out and inspection door at the suction end of the fan are shown at the upper left.



(Upper left) Outside of the building showing the type of building. The automatic louver shutters are for the main exhaust fan and for a small exhaust fan for a toilet. (Upper right) The 10-ton freon refrigerating compressor with the starting boxes at the left. (Lower left) Four direct expansion valves thermostatically controlled to the refrigerant in each of the four rows of serpentine coils. The sensitive thermostatic bulb is placed on the end of the coil to give the coil its full effect. (Lower right) The reducing coupling with nipple acts as a funnel waste for the condenser cooling water. The other pipe takes care of the condensation on the refrigerating coils. The pneumatic diaphragm damper in the back operates a mixing damper in the duct above.

Only 27% of Urban Homes Have Central Heating

RETURNS are now in for 17 additional cities covered by the Real Property Inventory under the direction of the Department of Commerce. Data presented here are somewhat in advance of the usual releases, and are available through the courtesy of Daniel E. Casey, under whose supervision the Inventory is being conducted.

The data for these 17 cities together with those for 25 other cities, the figures for which were presented on these pages last month†, are given below. The total for the whole 42 cities shows that out of a million dwellings surveyed so far only 27.1% have central heating plants. 72.3% of the dwellings are heated by stoves, fireplaces, and other means, and 0.6% have no heat. 16.7% of the buildings are heated with warm-air systems; 6.1% by steam or vapor, and 4.6% by hot water.

Data for the 42 cities show that coal is the most popular fuel for heating plants, rather closely followed by gas. 44.9% of the homes are heated by coal; 15.9% by wood; 34.7% by gas; 2.4% by oil, and 2.1% by other fuels.

Coal is by far the most popular fuel in Paducah,

(Continued on page 75)

†See "Survey of 25 Cities Discloses Large Market for Heating Plants," HEATING AND VENTILATING, June, 1934, page 44.

TYPE OF HEATING PLANT

City	Warm Air	%	Steam or Vapor	%	Hot Water	%	Heating Stove and Other	%	None	%
Charleston, S. C.	270	1.5	136	0.8	69	0.4	16,835	93.9	591	3.3
Jackson, Miss.	148	1.3	103	0.9	87	0.8	11,074	96.9	3	0.0
Topeka, Kan.	8,690	45.5	957	5.0	512	2.7	8,887	46.6	41	0.2
Austin, Tex.	358	2.5	57	0.4	8	0.1	13,953	96.8	13	0.1
Portland, Me.	1,888	9.6	10,070	51.1	2,063	10.5	5,577	28.3	11	0.1
Zanesville, Ohio	4,402	41.2	261	2.4	385	3.6	5,628	52.8	0	0.0
Williamsport, Pa.	5,495	45.3	1,489	12.3	1,694	14.0	3,426	28.2	7	0.0
Lansing, Mich.	15,001	72.1	2,663	12.8	406	1.9	2,712	13.1	25	0.1
St. Joseph, Mo.	8,315	41.7	990	5.0	460	2.3	10,148	50.9	13	0.1
Oklahoma City, Okla.	4,856	5.2	2,522	2.7	156	0.2	86,176	91.8	70	0.1
Sacramento, Cal.	11,099	17.3	3,837	6.0	453	0.7	47,927	74.5	972	1.5
Richmond, Va.	3,385	3.7	6,807	7.3	16,668	18.4	63,431	70.0	283	0.3
Dallas, Tex.	1,045	0.6	2,875	1.8	727	0.4	149,926	97.0	263	0.2
Knoxville, Tenn.	8,927	15.3	4,913	8.5	599	1.0	43,561	75.0	111	0.2
Kenosha, Wis.	16,836	64.5	880	3.4	3,599	13.8	4,766	18.3	5	0.0
Racine, Wis.	23,717	62.1	2,086	5.5	4,596	12.1	7,754	20.3	13	0.0
San Diego, Cal.	3,462	3.0	4,249	3.7	304	0.3	106,041	90.5	2,870	2.5
Total 17 Cities	117,894	15.0	44,895	5.7	32,786	4.2	587,822	74.4	5,291	0.7
Total 25 Other Cities†	63,598	21.3	21,682	7.3	14,252	4.8	197,033	66.2	1,364	0.4
Grand Total, 42 Cities	181,492	16.7	66,577	6.1	47,038	4.3	784,855	72.3	6,655	0.6

TYPE OF FUEL

City	Coal	%	Wood	%	Gas	%	Oil	%	Other	%
Charleston, S. C.	4,761	26.6	10,519	58.7	276	1.6	576	3.2	1,271	7.1
Jackson, Miss.	2,456	21.5	2,841	24.9	6,108	53.5	6	0.0	2	0.0
Topeka, Kan.	11,846	62.0	1,716	9.0	5,114	26.8	239	1.3	111	0.6
Austin, Tex.	237	1.6	5,512	38.3	8,430	58.5	66	0.5	130	0.9
Portland, Me.	15,916	80.9	357	1.8	62	0.3	2,109	10.7	1,067	5.4
Zanesville, Ohio	9,802	91.8	1	0.0	809	7.6	1	0.0	61	0.6
Williamsport, Pa.	11,748	96.8	40	0.3	73	0.6	225	1.9	17	0.1
Lansing, Mich.	20,253	97.3	16	0.1	45	0.2	346	1.7	119	0.6
St. Joseph, Mo.	16,765	84.1	327	1.7	1,591	8.0	1,100	5.5	126	0.6
Oklahoma City, Okla.	5,261	5.7	6,313	6.8	81,046	87.0	199	0.2	292	0.3
Sacramento, Cal.	4,551	7.2	31,963	50.4	23,978	37.8	2,156	3.4	677	1.2
Richmond, Va.	91,997	91.9	5,950	6.0	66	0.0	2,045	2.0	188	0.1
Dallas, Tex.	1,255	0.8	29,984	19.4	122,822	79.4	131	0.1	456	0.3
Knoxville, Tenn.	55,641	95.8	2,004	3.5	12	0.0	28	0.0	363	0.6
Kenosha, Wis.	25,262	96.9	18	0.1	26	0.1	701	2.7	57	0.2
Racine, Wis.	36,355	95.6	117	0.3	61	0.1	1,479	3.9	54	0.1
San Diego, Cal.	1,123	1.0	40,491	35.5	54,159	47.5	4,023	3.5	14,259	12.5
Total 17 Cities	315,229	39.8	138,169	17.5	304,678	38.4	15,430	1.9	19,250	2.4
Total 25 Other Cities†	162,744	60.0	30,660	11.2	64,031	23.6	10,254	3.8	3,712	1.4
Grand Total, 42 Cities	477,973	44.9	168,829	15.9	368,709	34.7	25,684	2.4	22,962	2.1

WHAT WILL I USE FOR MONEY?

nearly every case and the success of the engineer or contractor who goes in for modernizing work hinges on his ability to furnish a satisfactory answer. The question of finance is vital to modernization.

Before any modernizing job can actually go ahead the building owner must be able to pay for it. He, it is, who ultimately furnishes the wherewithal to enable the engineer to collect his fee, the contractor to pay his help and meet the cost of his equipment purchases. All this is so elementary that it seems foolish to repeat it. But the fact is that many a job has failed to materialize because of this one trouble. Everything goes well until the owner raises the question "What will I use for money?" It arises in

This being so, it is also essential that everyone who goes after modernization jobs has a pretty clear idea of just how he can go about furnishing the answer to this persistent question. There are answers—and practical answers—as evidenced by the fact that suitable plans are in everyday use by those who are now engaged in this work. Our present object is to analyze the situation and to outline these plans to such an extent that this application may be understandable.

Part 3—Deferred Payment Plans

OWNERS who need financial help to permit modernizing and who cannot get a direct loan because they have insufficient value to offer as security, can get loans through the special payment and special lending organizations. These organizations are grouped together, more or less loosely, as installment-payment organizations and the plans are spoken of as installment buying or installment selling. Use of these methods has grown so fast and so many highly specialized plans of this general character have come into existence that it is worth while to go over their chief features and to note the truly tremendous sums which are available to owners. Many of these plans are developed or adapted especially to meet the needs of the depression years and were especially intended to promote modernizing.

Essential Features of the Plans

All of these plans use a combination of factors to build up a security to the lender, since the borrower supposedly does not himself have enough of value to offer to secure the loan. The security usually finally consists of a claim on the equipment itself, notes signed by the purchaser and setting forth the promise to pay, a down payment of cash, a statement of credit facts on the part of the purchaser, and a second signature on the paper signed by the purchaser, usually that of the contractor. Details vary with each particular plan, but the general nature of the security remains the same.

Essential to the success of these plans for furnishing money are the method of repayment and the ability of the purchaser eventually to repay. Ability to repay is judged by the statement of credit facts furnished by the purchaser and which well-managed lending organizations check up to verify. As the contractor who attaches his name to the purchaser's paper also assumes a contingent liability, he is interested in making sure that the purchaser can really repay.

There are two principal variations of the method of repaying the loan. One, and the best known method, is a schedule of equal installments payable monthly for a stated period. The other is the method of "pay-out-of-savings." This plan is less frequently used and consequently less well known.

The period of repayment varies with the amount borrowed and with the ability of the purchaser to repay, in the case of the fixed monthly plans, and with the amount of the saving realized in the case of the "pay-out-of-savings" plan. In the usual case, the period seldom exceeds three years, although funds are available for longer periods.

Lending Agencies

Who are the people having all these funds available, is a question which may very well be looked into, especially by a contractor or engineer who expects to do business with them. The number of these organizations is so variously estimated that little reliance can be placed on the figures. They have spread with such speed that they have outgained the figures. They are known by various names, of which probably "finance company" is the most used. They are really investment banks and in some states are under the supervision of banking departments. The larger ones operate nationally and have offices in practically every city of any importance. At present there is scarcely a city where there is not an office of one of these companies.

In the main, they now operate free of the criticism aimed at them when they were young. Their charges are now calculated from experience and are generally not excessive for the type of risk. They are still high, to be sure, for the security is not looked on with such favor as are those which are better known. The general principle of "the greater the risk the higher the rate" applies to these loans.

One of the largest of these general finance companies has some 125 branches in practically every state and

one of its executives states that at present it is equipped to handle $500 million of loans. Supposedly, a good proportion of this could be used for loans on heating and ventilating modernizing if the need arose. This same executive estimates that the total available for lending on modernization through commercial credit companies alone is not less than $2 billion. Generally, these organizations are not particular who manufactures the equipment on which they extend loans except to be reasonably sure that it is sound. They stress the credit value and reputation of the purchaser and the contractor. In some cases manufacturers themselves make agreements whereby contractors can make use of the services of particular finance companies. There are few items of equipment for modernizing work which are not now or have not been financed by these companies at some time.

Another group of lenders operating on this general plan are those who are interested only in certain equipment and who make arrangements for financing its purchase. They do not conduct a general financing business, but limit themselves to a particular interest. Included are a few contractors, a few wholesalers, and certain manufacturers of equipment. The method of operation varies all the way from simply making arrangements with a customer of known good standing to pay off on a deferred plan, to formal organization of subsidiary corporations for the specific purpose of handling these transactions. The amounts available to building owners through these sources are not known, but it is known that one of these organizations recently considered a single contract which would amount to $10 million. From this it can be concluded that the total available is large and one estimator has stated it at not less than $200 million. Some 25 manufacturers of heating and ventilating materials are said to have their own finance department. Usually these departments are entirely free of other activities, such as production and selling, for instance, and in some cases have corporate names entirely different from those of the parent company. Generally, these plans are limited directly to financing work where the manufacturer's own equipment is all, or substantially all, of that included in the job. In a few cases, however, the plan is such that as little as 40% of the maker's own equipment is included; the rest can be of other make.

Utility companies in many cases have deferred-payment plans of their own whereby equipment sold by them can be financed. In general they do not extend this plan to cases where installation constitutes any substantial part of the total cost, nor make their plan available to independent contractors.

How These Plans Work

The fixed monthly repayment plan can be simply illustrated by the following example: Total value of labor and equipment sold is, let us say, $450, and the owner can pay in a period of 24 months. His monthly payment would approximate $20, arrived at by subtracting the down payment (10%) from $450, and adding on the financing charge (say $60), leaving an unpaid balance of $450 — $45 + $60 = $465, and dividing this by 24 results in a payment of $19.37.

Where the "pay-as-you-save" plan is used, it is not possible to give a general example so readily. The amount of the annual saving enters in and must be fairly well known in advance and a method of computing it must also be included in the agreement. Unless the annual saving is large or the down payment relatively great, the period of repayment is necessarily rather extended.

In the most usual of the deferred payment plans, the procedure is substantially as follows: If the contractor is willing to co-sign the agreement with the purchaser, and thus in effect guarantee payment, he can receive the full amount of the contract in cash from the finance company as soon as the purchaser signs a certificate of satisfaction on the installation and tenders a promisory note to the finance company. Where the contractor does not co-sign with the purchaser, he can obtain 90% of the full cash-contract price from the finance company and the other 10% when final payment is made by the purchaser. Other plans vary from this in detail, but are the same in principle.

How Engineers and Contractors Fit In

With all these plans worked out, and with the large sums of money available for use through them, we can now see how they affect the engineers and contractors.

Engineers are affected principally in that the existence of such plans permits a considerable quantity of work to be undertaken which otherwise could not be done, and on knowing that lack of money *need* not be a reason for holding up work. Also in preparing plans and supervising bids, he can be satisfied that any reputable contractor can arrange for a deferred-payment connection on nearly any job where the credit of the purchaser is at all sound, if it becomes necessary to finance the plan in this way.

Contractors, on the other hand, are directly interested. The logical thing to do is to learn not only what is avaliable locally but to know how and under what terms. So, too, should the special manufacturers' plans be carefully examined. With modernizing work taking on the importance it is, and with the amount of it which necessarily has to be done through some kind of credit arrangement, no contractor can afford to let the absence of a deferred-payment plan stand between him and a job. On the other hand, there are some risks involved and they should be carefully weighed and fully considered. A good credit risk is usually known, especially in the smaller communities, and the established contractor has the advantage of his knowledge of local conditions.

Deferred-payment plans are important in the present situation and with the large amounts available they can be used effectively as an answer to the "What Will I Use for Money?" question. Their widest application so far in modernizing heating and ventilating plants has been in residential work where the amounts of the individual loan are small. They are by no means necessarily confined to this kind of work, though, and it can be reasonably expected that they will loom increasingly large in financing modernizing for some time to come.

National Housing Act, to Encourage Home Modernizing, Passed and Approved

As we go to press, word is received from Washington that President Roosevelt signed the Housing Act June 28 and on July 1 appointed James E. Moffett as Administrator of the Act. Mr. Moffett was once virtually "fired" by Standard Oil of New Jersey for his support of Roosevelt policies.—Editor

THE National Housing Act came through the jam at the end of the Congressional session. As passed, after a conference to iron out differences between the Senate and the House versions, it is changed considerably from its original form but retains the essential ideas. It still can become the basis for a renewed confidence in real estate and a means for promoting a large volume of immediate modernizing work. Its friends regard it as wholly sound. Its advocates hail it as the greatest step ever taken in this country to advance the cause of adequate and honest housing. Its enemies view it with alarm, for they fear that it may result in harm to their particular interests. Reception of the act has, on the whole, been good.

Little has been done about putting the provisions into operation for a Federal Housing Administration (FHA) must be organized. The act sets up this organization and in doing so departs from the original proposal which called for a corporation. As the act puts virtually the whole administration under the control of an Administrator and makes it his duty to draw up regulations, it is evident that nothing can be done until the Administrator is able to get going. Speed is aimed at, however, and there is every reason to expect that the provisions will be made workable promptly.

Five titles are included in the act as passed. One creates the administration and outlines the powers and duties; another is devoted to mutual mortgage insurance; the third permits formation of the national mortgage associations; the fourth has to do with insurance of savings and loan accounts; while the last contains miscellaneous provisions designed to bring existing laws into line with the new act.

Modernizing Plan

The section authorizing formation of the Administration specifically empowers the Administrator under his own terms to insure financial lending institutions against losses incurred by them due to advances for repair and improvements on real estate, but these insured loans must be made between the date of enactment and January, 1936, or earlier. The insurance so granted can be on any kind of property and is not limited to homes, but must not exceed 20% of the total loan nor can the loan exceed $2000. The amount of insurance so granted must not exceed $200,000,000.

This is the section on which the modernizing program is based. If all the $200,000,000 of insurance were written at 20% of the total loan, it will be seen that one billion worth of insured loans could be issued by banks, trust companies, finance companies, etc. The Administrator is further authorized to lend to these same institutions on the security of obligations which are insurable. In other words, he may not only insure the private lenders against loss up to 20% of their losses for modernizing, but he may take over their signed agreements which are the basis for the work. In this way the Administrator may really furnish the money for the prosecution of the project. Details are subject to such regulation as the Administrator may draw up. It is because of this provision that the modernizing plan must await the action of the new Administrator.

Insurance of Home and Low-Cost Housing Mortgages

A fund is set up under the control of the Administrator which may be used for insuring amortized home mortgages up to $16,000 face value and 80% of the appraised value of the home, and up to $10,000,000 on low-cost housing projects. Such insurance may be issued up to one billion on projects existing before passage of the act and in a like amount on projects built after said passage.

This part of the act then sets up a mutual mortgage insurance plan under government operation intended to permit insuring good existing mortgages and offering a place where like mortgages on new construction can be insured. Defaults permit the mortgage holder to receive debentures of the Administration which are guaranteed as to principal and interest (at 3%) which mature three years after the maturity date of the defaulted mortgage. It is confidently expected that this insurance provision will do much to revive confidence in amortized long-term mortgages as a safe investment.

National Mortgage Associations

A unique provision of the act allows the Administrator to establish private mortgage associations. These are to be organized with Federal charters and having a paid-in capital of not less than $5,000,000 to engage in the business of buying and selling first mortgages having not more than 80% of the appraised value of the mortgaged property. They may borrow money for this purpose through issuing notes, bonds, or debentures, and may have these outstanding in amounts up to 10 times the value of their outstanding capital stock or up to the sum of the face value of the insured mortgages and cash. Their affairs are to be subject to periodical examination by the Administrator in the same way that the affairs of banks are examined. These associations are expected to be another means of promoting confidence in mortgages and to act as pools of funds seeking mortgage investment which will have the effect of permitting excess funds in one locality to be invested in another.

(Continued on page 74)

Cincinnati Store Modernizes With Air Conditioning

By H. S. YODER†

The John Shillito Company Department Store, Cincinnati

A $100,000 air conditioning system which embodies the most advanced features of central plant design, has recently been installed in the John Shillito department store, Cincinnati, as a forward step in the new trend toward modernization, and a means of providing conditions of maximum comfort for patrons.

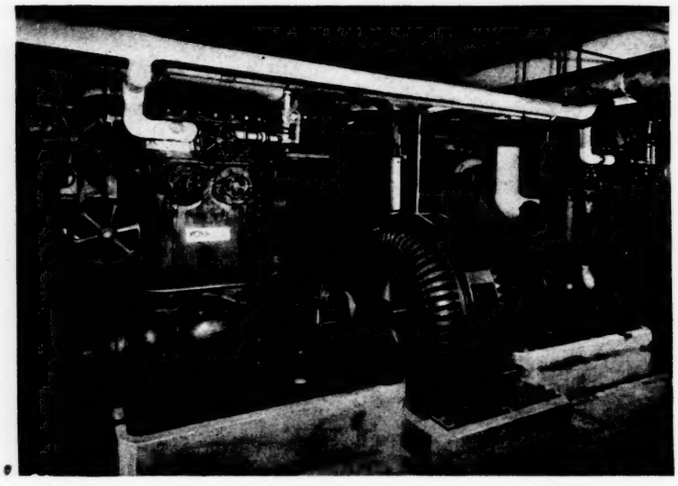
The system is of the central plant type, with all necessary auxiliary equipment, such as dehumidifier, preheaters, reheaters, air filters, ducts, and fans, and serves the basement, first main floor, first annex floor, arcade, beauty parlor, second and third main floors, and the third floor of the store annex, with provision for future extension to serve other sections of the building as needed.

Three 14 in. × 10 in. freon compressors provide 375 tons of cooling capacity daily for the air conditioning of more than 115,000 sq. ft. of floor space. Two of the compressors are in a duplex unit and the other is a simplex unit directly connected with a 150-hp. motor. Each compressor is equipped with a 25% and 50% capacity bypass and semi-automatic control.

Air is distributed through galvanized steel ducts insulated where they pass through unconditioned areas. Air distribution is of the local recirculation type. The velocity and flow of air through these ducts, and through the branches which run to each room, is maintained by the use of a main vertical riser and a booster fan on the air supply. Each floor is equipped with an individual fan and mixing dampers which automatically regulate the flow of dehumidified and by-passed air.

Auxiliary motor equipment used in connection with the system consists of a 30-hp. unit on the booster fan, 15 hp. on the basement air supply fan, 30 hp. on air washer pump, 10 hp. on the first main floor air supply, and 5 hp. each for the arcade and the second and third main floor air supply, with several smaller motor units serving the beauty parlor and annex sections.

Installation of this modern air conditioning system, put in full operation during the past month, is confidently expected to show results in a considerable increase in the volume of business throughout the summer months, according to one of the store executives. In his opinion people prefer to do their shopping under conditions of the greatest possible physical comfort. The store that can offer them these conditions, where they can shop in comfort, and inspect merchandise at their leisure, with right conditions of temperature and humidity, is going to find that its investment brings a definite return in increased patronage, through customer good will, with added sales.



Refrigerating compressor installed in the Shillito Department Store

† Sales manager, Cleveland Branch, York Ice Machinery Corporation.

A.S.H.V.E. and A.S.R.E Hold Joint Session at Summer Meetings in the Poconos

BUCK HILL FALLS, PA. — Over 250 members and guests attended the semi-annual meeting of the American Society of Heating and Ventilating Engineers held at The Inn here June 19-22. At the same time the American Society of Refrigerating Engineers was holding its summer meeting at Skytop, seven miles from here, and a feature of the convention was a joint session between the two organizations.

Social events included a steak dinner held jointly by the two societies at Skytop, the banquets held June 21, golf tournaments, and other outdoor sports.

W. Chevalier, vice-president of McGraw-Hill Publishing Company, Inc., spoke at the luncheon June 19 on "Examining the Construction Recovery Program."

"Criteria for Industrial Exhaust Systems" was the subject of a paper by J. J. Bloomfield, sanitary engineer, Bureau of Public Health. The speaker stated that "knowledge of the requirements of industrial exhaust systems, for the effective removal from the air of toxic dusts, fumes, gases, and vapors, in an effort to maintain hygienic conditions in workrooms is of importance to the engineer. Although the installation and use of correctly designed exhaust systems are essential in the maintenance of hygienically safe conditions, they are not in themselves a complete solution of the entire problem. Exhaust ventilation devices, like any other machinery, require constant care if adequate protection is to be afforded to the industrial worker. Hence, it is essential that such systems be tested from time to time in an effort to determine how effectively they are functioning and if they are being maintained properly. Such an evaluation requires the actual determination of those substances in the air which the system was designed to eliminate." Mr. Bloomington's paper treated in a general way some of the methods and instruments which may be used in testing the efficiency of industrial exhaust systems.

One of the outstanding results of the last 20 years of research in the field of dust inhalation is the demonstration of the fact that, in general, the degree of health hazard associated with the inhalation of any dust, all other factors remaining constant, is dependent upon the mineralogical composition of the dust. For example, it is now established that the inhalation of certain types of dust, such as granite dust (1), will in time produce fibrosis of the lungs, frequently associated with tuberculosis. In other cases exposure to dust may result in the production of a far lesser degree of fibrosis without subsequent tuberculosis; this is true of cement dust (2). And finally, there are certain types of dusts which produce little lung fibrosis, as typified by marble dust (3). In general it has been found that those dusts which are high in quartz content are the ones which most readily produce a disabling fibrosis of the lungs. Hence, the necessity for knowledge concerning the chemical and mineralogical composition of a dust is obvious.

Present day knowledge of the effect on the lungs of inhaled dust is more complete for quartz-containing dusts than for any other type of particulate matter. In general, it has been found that the harmfulness of a quartz-containing dust is in direct proportion to its quartz content. For this reason in attempting to evaluate the harmfulness of a dust it is of the utmost importance to ascertain its quartz content. This is best done by a combined chemical and petrographic analysis.

The speaker stated that "it has been demonstrated that particles of a size greater than 10 to 12 microns in longest dimension are very seldom found in the lungs. This absence of larger particles is partly due to the fact that the numbers of such particles greater than 10 microns in size present in industrial air is, as compared with the lower sizes, comparatively small and due to gravity and the protective action of the mucous surfaces of the upper respiratory tract, these larger particles do not penetrate to the terminal portions of the respiratory tract. Hence attention need only be given to those dust particles which are less than 10 microns in longest dimension."

The following table is a summary of the average dust content of the air in certain dusty industries:

AVERAGE DUST COUNT IN CERTAIN DUSTY TRADES

Industry	Dust Count In Millions of Particles Per Cubic Foot of Air
Slate Finishing Mills	
Floormen	1598.0
Loaders	1276.0
Disc crusher operators	312.8
Talc Mining	
Jack-hammer drillers	2159.8
Muckers	44.8
Talc Finishing Mills	
Crushers and cylindermen	14.0
Packers	50.1
Marble Carvers	19.1
Marble Cutters	32.8
Granite Quarrying	
Leyner drillers	144.4
Jack-hammer drillers	112.1
Plug drillers	36.9
Cement Mill, aver. of all operations	26.0
Granite Cutting	
Hand pneumatic tool operatives	59.2
Machine pneumatic tool operatives	35.9
Attendant labor	17.0
Anthracite Coal Mining	
Miners and miners' helpers	231.5
Attendant labor	31.1
Bituminous Coal Mining	
Coal cutters and coal loaders	112.3
Attendant labor	3.9
Silverware Manufacturing	
Dusty processes	5.2
Non-dusty processes	1.7
Municipal Dust (Street Cleaners)	
Congested district	4.1
Residential district	1.8
Cotton Industry	
Carding room	8.6
Weaving and spinning room	4.5

Some of the common poisonous dusts which exist in industrial atmospheres are the compounds of lead, cadmium, arsenic, mercury, etc. For the collection of these dusts one may employ any one of several instruments. For the collection of radioactive dusts (13), the paper thimble has been successfully used. "In practice, a single thickness Whatman extraction paper thimble, containing cotton wool, well fluffed out, is employed. Air is passed through such a thimble at the rate of 1 to 2 c.f m., until sufficient dust has been collected, after which the contents of the thimble is subjected to a chemical analysis."

The most common fumes encountered in industry are those originating from the oxidation of vapors formed by the heating of metals to high temperatures. Some of these fumes present in the air of workrooms are lead oxides, cadmium oxides, zinc oxides, etc. These fumes may be collected either by the electrical precipitating method (14) or by the impinger apparatus (10).

"The gas and vapor hazards of modern industry are extremely important and the fatalities from poisoning by such substances increase year by year. Gases and vapors occur as raw materials, as products, and as agents in manufacturing processes. Among some of the common gases one may list carbon monoxide, sulphur dioxide, hydrogen sulphide, hydrogen cyanide, ammonia, and some of the gases now used for refrigerating purposes, such as methyl and ethyl chloride. Many chemicals which are volatile at ordinary room temperatures, are used very extensively in industry in the form of solvents and lacquers. They constitute an extremely important group of contaminants and are characterized by their low density and easy volatility. Among some of the common

vapors of a toxic nature found in industry are benzol, carbon disulphide, methyl alcohol, carbon tetrachloride, and trichlorethylene."

As a result of a prolonged study of the health of the workers engaged in the various occupations of granite cutting (1), it was possible to demonstrate that those persons engaged for many years in tasks associated with a dust exposure of less than 10 million particles per cubic foot of air were not suffering from silicosis or tuberculosis, the diseases most prevalent among these granite cutters. It was also possible to demonstrate that among these granite cutters the incidence of silicosis and tuberculosis, all other factors being equal, was directly proportional to the degree of dust exposure. The solution of the dust problem in the granite cutting industry therefore, resolved itself in the removal of the dust at its source, to an amount less than 10 million particles per cubic foot, preferably by exhaust ventilation devices.

Dry Bulb vs. Effective Temperature Control

A. E. Beals presented an interesting discussion "Dry Bulb vs. Effective Temperature Control." The author referred to the determination of effective temperatures and the location of home comfort zones on the psychrometric chart and pointed out their value. Some limitations in connection with the use of these charts were discussed by Mr. Beals who said that "from a condition of 82° effective temperature, one will experience a much greater degree of temporary comfort, at an effective temperature of 76½° than at 74° if the relative humidity is at the proper point. In fact, an effective temperature of 76½° by contrast, would seem quite comfortable, if the relative humidity was such that perspiration was not unduly evidenced. Therefore, homes, expecting visitors, or offices, desiring business callers, should not be constantly maintained under a condition of maximum comfort, regardless of prevailing outside circumstances. This fact was rather belatedly recognized in the case of theaters, auditoriums, and department stores, and a code was devised governing the cooling of such places.

"The A.S.H.V.E. Ventilation Standards stipulate that effective temperatures between 64° and 69° shall be maintained during the winter season, and between 69° and 73° during the summer when cooling is required. They also provide that the relative humidity shall not be less than 30% nor greater than 60%.

"Considering only the summer conditions, this code covers quite a large area upon a psychrometric chart but the range of effective temperatures is small. As the conditions cited apply only to cases where the bodily sensation has reached equilibrium with the surrounding air, no consideration was given to outside temperatures and humidities, nor to the possible contrast in passing from one to the other. The need, however, for reducing the contrast between the outside and inside conditions was evident. Therefore, as a concession, it was further recommended that the inside dry-bulb temperature be maintained at 72° plus one-third of the difference between the outside dry-bulb temperature and 70°.

"In the light of all the information gained during the research into effective temperatures, it is a perfectly natural question to ask, why the outside dry-bulb temperature alone should, in any way, have a bearing upon the inside dry-bulb temperature. And a still more pertinent question would be, why should the outside *dry-bulb* temperature alone govern the inside *effective* temperatures.

"If the dry-bulb temperature of itself is not an indication of bodily sensation on the inside of a theater, neither is it any criterion of the sensation experienced on the outside. Therefore, the relations of the dry-bulb temperatures within and without an auditorium, in no way measure the contrast experienced by the human body in passing from one to the other."

The author went on to say that "an effective temperature midway between the outside effective temperature and an effective temperature of 71° would appear to be a reasonable compromise between the condition of maximum comfort and the discomfort of the outside environment. It would insure relief from the outside conditions and a sense of temporary comfort without undue shock, when passing either in or out.

"The relative humidity should follow rather closely the 'perspiration line.' This, through the required range, approximates 60% for the lower and 50% for the higher temperatures. Thus, while perspiration would not be unpleasantly evident, the rate of evaporation would not be sufficient to foster a sensation of chilliness. A regulation of this nature, which is based upon scientific principles governing inside conditions to be maintained, would seem to be ideal for short time exposures. It is also a regulation which is susceptible of 100% automatic control."

One of the most difficult calculations in heat loss is that of determining the amount that the stack effect of a tall building will have on the heat loss in the upper and lower floors. This subject is now being studied in the Penobscot Building, Detroit, and Axel Marin, associate professor, University of Michigan, described the tests and preliminary results so far obtained in his paper "Influence of Stack Effect on the Heat Loss in Tall Buildings." This paper was a report of the work being done in cooperation with the Technical Advisory Committee on Heat Losses from Buildings of the A.S.H.V.E. The author acknowledged the assistance of the owners of the Penobscot Building, the building engineer, G. M. Lewis, and the Detroit Edison Company. The author's paper described the tests set up and the preliminary results. According to him, the data showed that it requires more heat to maintain the same room temperature "on the lower floors of this building, for a given exposure, than it does on the upper floors. The difference in the amount of heat necessary to heat the 32nd floor test room is approximately 40% less than that required to heat the 8th floor room, when expressed on the same amount of exposed wall and glass.

"The *Guide* 1934 method of calculating the heat loss for the 8th floor, which is below the neutral zone, does not give values of heat quantities that compared with those obtained by these tests. The portion of this difference that is due to infiltration cannot be definitely stated at this time, but it is hoped that the future tests being planned will answer this question."

The estimation of the heating requirements of buildings is the most fundamental practice of the heating and ventilating engineer. It has been the subject of continuous study since the heating of buildings became an important branch of the engineering industry. The determination of the heating load of a building requires first, knowledge concerning heat transfer and infiltration through the various types of construction involved for a practical range of temperature differences and wind velocities; second, knowledge concerning the weather conditions to which the building will be subjected; third, knowledge concerning the proper application of the items listed in formulas to give the resultant heat loss from the completed building or room under consideration.

During recent years research has been directed more intensively toward the extension of the available data on heat transfer and infiltration, and as a result, these data are now better understood than the facts concerning the probable temperatures, wind velocities, sun effect, heat capacity, and other environmental conditions and their use in the calculation of the final results.

Wind Velocities and Heat Losses

Their investigation of this subject has been approved as a major research project of the A.S.H.V.E., and a report on this research was presented by F. C. Houghten, J. L. Blackshaw, and Carl Gutberlet, all of the A.S.H.V.E. Research Laboratory, in a paper entitled "Wind Velocities Near a Building and Their Effect on Heat Loss."

This report, dealing with wind velocities and temperatures near the windows of several rooms, and their relation to weather bureau observations and heat loss through windows, represents an analysis of a small phase

(Continued on page 57)

District Heating Engineers Hold 25th Convention; Gaskill Resigns as Secretary

Marking the silver anniversary of the Association, the annual convention of the National District Heating Association, held at the Sagamore Hotel, Rochester, N. Y., June 12-15, attracted an attendance of 150.

The meeting also ended 25 years of service of the veteran secretary-treasurer D. L. Gaskill, who presented his resignation to the convention. In recognition of the esteem of the members and as a mark of appreciation of his long service, Mr. Gaskill was elected to honorary life membership at the closing session.

At the same session W. J. Baldwin, Jr., New York Steam Corporation, was elected to the presidency. Other officers were advanced, while T. E. Purcell, Allegheny County Steam Heating Co., Pittsburgh, is the new third vice-president. New members of the executive committee are H. J. Bauer, New York Steam Corporation, and J. P. McCausland, Jr., Philadelphia Electric Company.

At the opening morning session, June 12, reports and routine business followed the opening formalities which began with a hearty welcome on the part of Herman Russell, president, Rochester Gas & Electric Corporation, and concluded with a response by W. J. Baldwin, Jr. President Hillemeyer in his formal address reviewed the work of the year and outlined problems which he and his advisors had to face. He closed with recommendations to the effect that the association broaden both its scope and its membership.

The secretary reported excellent results for the financial operations of the year and stated that both dues and membership were in the best shape for several years past.

Under the chairmanship of D. S. Boyden, the Educational Committee had prepared material on steam refrigeration suitable for adding to the Handbook of the Association, thus bringing up-to-date some much-needed information on this subject. Active projects of this committee also include the preparation of a comprehensive index of the Association's publications, and a course on district heating suitable for use in company schools.

H. C. Kimbrough, American District Steam Company, reporting on the membership work announced that there had been a net increase of 27 during the year, while there was a total of 67 new members. M. D. Engle, Edison Electric Illuminating Company of Boston, asked cooperation in assembling interesting material for the Bulletin.

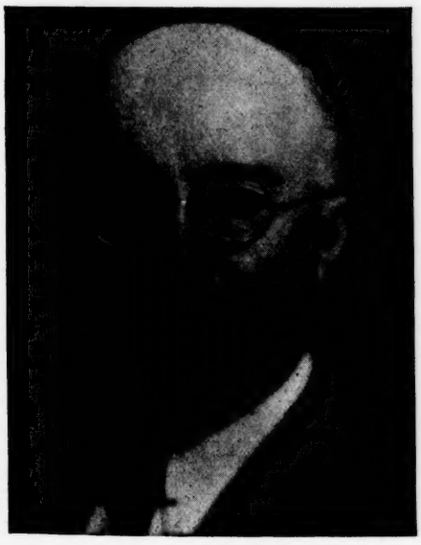
At the afternoon meeting the reports of the Rates and Regulations, Research, and Meters committees occupied the full time. The demand form of rate came in for considerable discussion as did also questions of rate form and coal and labor-cost clauses. The Research Committee presented reports dealing with corrosion, reducing valves, and comparisons of steam flow formulas. Corrosion study has resulted in a workable method of testing and measuring the amount of corrosion, and standard field methods for sampling condensate have been worked out and made available in pamphlet form. Means for proportioning reducing valves and selecting proper sizes have not been in a satisfactory state and the Research Committee reported progress in an attempt to tabulate information which will correct this condition. The work on the steam flow formula is still in a preliminary stage and it is hoped that when completed it will be possible to predict the formula which is best adapted for use in any specific case of steam flow. The Meters Committee reported on eight projects which included a study of load and load factors, test data on various types of meters, studies of the effect of pulsating flow of steam on meter accuracy, the proper design of orifices, nozzles, and venturi tubes as primary elements of flow meters, and a study of the minimum number of readings per month on condensation meters to maintain accuracy.

On Tuesday evening, the Rochester Gas & Electric Corporation dedicated its regular radio program over Station W.H.A.M., Rochester, to the N.D.H.A. and district heating. A brief dramatized history of the birth of district steam heating then followed, the characters represented being Birdsell Holley and Mrs. Holley.

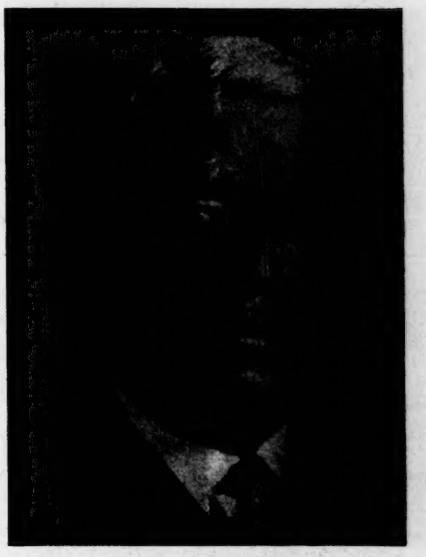
Tuesday evening's regular session was devoted to the reports of the committees on Hot Water Heating and on Operating Statistics. Highlights in the work of the Hot Water Committee were papers on European hot water practice and operating results obtained at the Cities Service Building in New York, the first really high building to use hot water for heating.

Commercial Relations and Sales Development occupied the session on Wednesday morning which was devoted to the committees on these subjects. Commercial Relations were covered by five papers which included one on economizers, on standard methods of determining building volumes, on the variation of the degree-day base for different parts of the heating season, and two papers on controls. The discussion of the degree-day base and of the proper use of this yardstick when applied to unit steam consumption was especially lively. It was suggested that it is better procedure to leave the base steady and express variations from it rather than to vary the base itself. The concluding papers on this part of the program described how an old one-pipe system had been successfully modernized with excellent results by the use of modern controls, and a summary of recent developments in

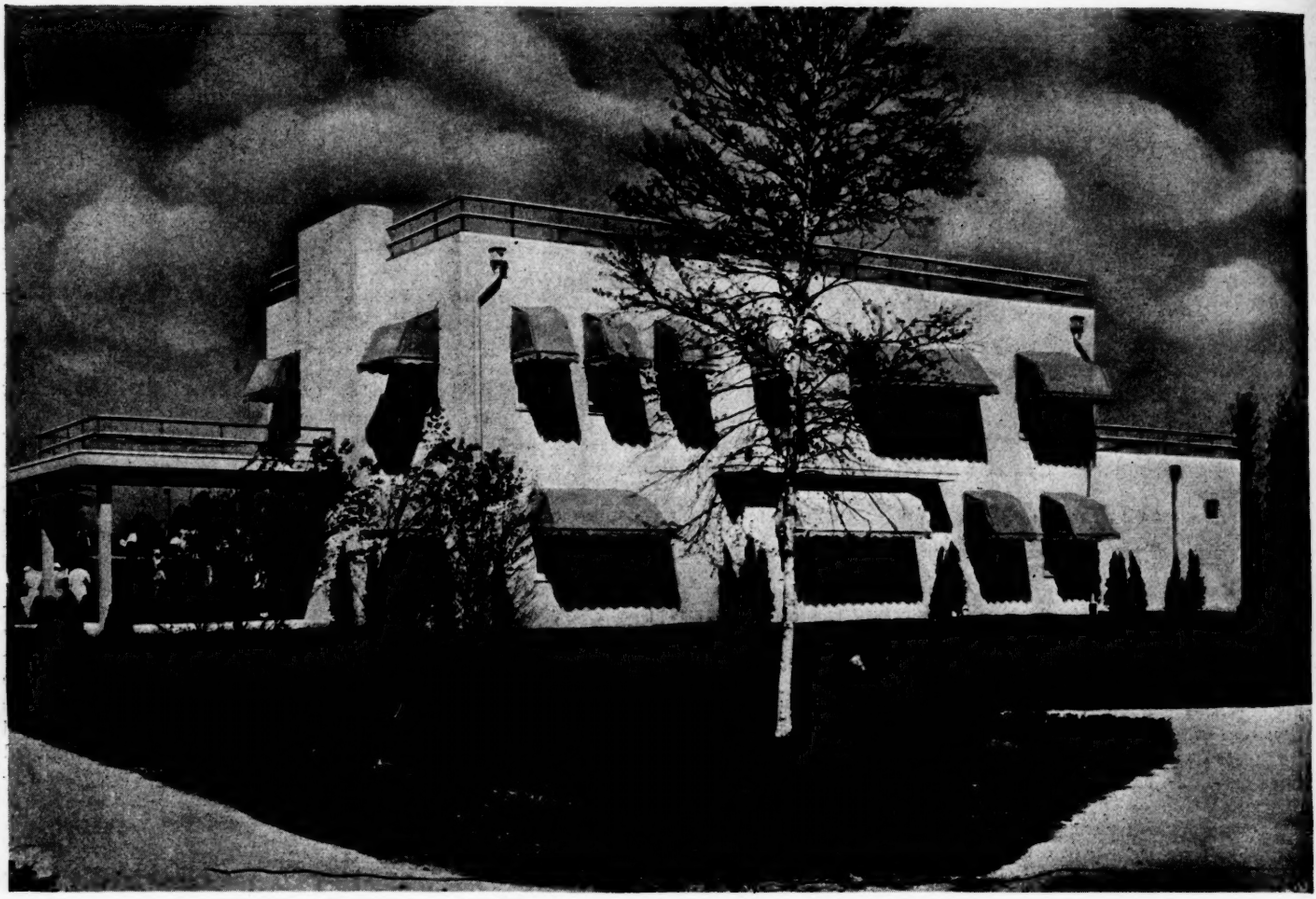
(Continued on page 61)



W. J. Baldwin, Jr.,
new N.D.H.A. president



D. L. Gaskill,
who retired as N.D.H.A. secretary



The modern home as exemplified by the Frigidaire air conditioned house at A Century of Progress in Chicago. The home has an ideal setting in the General Motors garden on the shore of Lake Michigan

Air Cooling at the 1934 Century of Progress Exposition

THE Chicago Fair, officially A Century of Progress, in its 1934 showing makes much more of a feature of air cooling and conditioning than was the case last year. In fact, it is confidently expected that with the new arrangements whereby a great deal of this equipment can be seen in actual operation, air conditioning will be one of the most popular subjects in the whole Fair. Air cooling is especially prominent, with upward of 40 concessions operating about 650 tons of refrigeration for cooling air.

The largest installation of cooling operating in a concession is in the German Black Forest Village—a new feature this year. Here two CO_2 compressors of 35- and 50-ton capacity cool the air in two restaurants. Temperatures are maintained at 80° and relative humidity at 50% in order to give a feeling of comfort similar to that experienced in the Black Forest. In this same village concession is an ice skating pond measuring 1600 sq. ft. A hard-wood dance floor covers and protects the skating rink when it is not in use. When the skating rink is used this floor is pulled aside by a remotely controlled motor.

Last year the several villages attracted great attention. This year they are expected to be even more popular.

Another cooled restaurant on the grounds is to be found in the Hall of Science Building where the air conditioning equipment is enclosed in a glass-partitioned space, making it a very attractive exhibit. A sign calls attention to the fact that the air conditioning system of 80-tons capacity cost $14,000.

Small theaters where visitors can sit down and listen to talks about the exhibit are a favorite method of attracting an audience in many parts of the Fair. In a number of cases exhibitors are this year cooling these small theaters. Among these is one adjoining the Westinghouse exhibit which seats 150 persons, as does also one at the Union Carbide & Carbon exhibit and another at the Central Station Puppet Show; 300-seat cooled theaters include those at the Ford exhibition, the General Electric exhibition and Frigidaire, while what is claimed to be the world's smallest air cooled theater contains 22 seats and is operated by Household Finance Corporation. In the English Village the Globe Theater,

which is an exact duplicate of the theater where the original Shakespearean plays were enacted, is likewise cooled with a 38-ton compressor. Leonard Refrigerator Company also has an air conditioned theater.

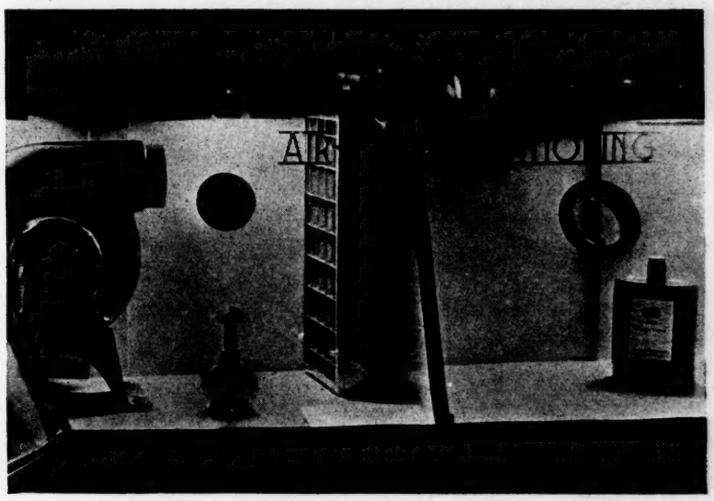
Another part of the Fair which last year attracted much attention is the section where modern designed houses are located. This year one of these known as the "House of Tomorrow"—a building in the shape of an octagon—two stories high with large window space —is cooled by means of a 5-ton unit.

A newcomer in the housing group is the Frigidaire air conditioned house located on the lake shore near the General Motors building. Air conditioning is one of the factors which received the greatest attention when this house was planned, being air conditioned throughout. The space surrounding it has been carefully landscaped, and while not intended to be a "wonder home" it is very attractive in appearance. The air conditioning installation takes into account the fact that large crowds of people will be continually passing through the house. For this reason, an extra large cooling capacity had to be provided. As worked out, the plant is so arranged that it is in two parts. One part applies cooling to room units in the same way as would be done for a house of normal occupancy. The other part of the cooling plant is located in a garage and supplies circulating air which is admitted to the rooms near the ceiling at low velocities so as not to interfere with the normal operation of the room units. In order to accomplish this a false ceiling ledge molding with about 2 in. continuous opening around the room is built in.

This house is also furnished with a number of interesting devices among which is a method of automatically closing windows in case of rain; awnings operated through a photo-electric cell on the roof which causes awnings to raise or lower automatically.

Among other applications of air conditioning are the exhibits of General Cigar Company, and the Singer Sewing Machine Company. In addition, several of the cooled theaters exhaust their cooled air into the surrounding exhibit space. In the Hall of States, the space occupied by the State of Florida is cooled.

Among the exhibitors who show heating equipment are Crane Company which has a special exhibit building in the Home and Industrial Arts group where an oil-burning boiler is operated and where many of this company's long line of valves, boilers, and radiators are displayed, including its humidifying radiators.



Display of the Union Carbide and Carbon Corporation at A Century of Progress, demonstrating use of vitalized carbon to remove odors from the air. The space around the blower fan is kept in an odorous condition by a chemical. The air is then passed through a filter of carbon which extracts the odor.

American Radiator & Standard Sanitary Corporation also uses extensive space, as was done last year. It is cooled by a 25-ton Decalorator steam jet refrigerating apparatus which is so arranged that all the process from steam boiler to the air washer can be seen.

Other exhibitors at the Fair include Hess Warming & Ventilating Company, Modern Coal Company, Weil-McLain Company, Anthracite Institute, Iron Fireman Mfg. Company, Kohler Company, and Peoples Gas, Light and Coke Company.

Transportation has been stressed ever since the Fair opened. The Progress of Transportation Pageant received wide recognition as one of the best done acts put on last year and the Transportation Building and exhibits were generally agreed to be outstanding. This year not only is the cooled B. & O. train on view, but the new lightweight flyers of both the Burlington and Union Pacific are on the grounds. Both are air conditioned. Their presence will undoubtedly serve to attract a good deal of attention not only to the trains themselves but to their use of air conditioning especially.

The buildings put up by the Fair itself were intended to be temporary and little attention was paid to heating. The ventilating plants, however, are large, having been installed on the basis of four c.f.m. per sq. ft. of floor area. The 409 ventilating fans with a capacity of 5,500,000 c.f.m. have not been changed notably to accommodate the 1934 showing.

Although not necessarily air conditioned, many of the homes exhibited at the Fair are of more than passing interest. The Masonite House shows the structural advantages of this material. Heating and air conditioning units are located on the main floor.

The Stran-Steel Irwin Garden Home employs a framework of specially fabricated steel members, so that ordinary nails can be driven into them. It is claimed that the steel units have 25% more nail grip than wood, and erection time compares favorably with ordinary wood construction.

Only three weeks are required to completely finish the Crystal House, the walls of which are of heavy plate glass. At the main floor level this is non-transparent ripple glass, while the glass on the second floor is aqua-tinted to filter the sun's rays, and above this, clear glass is used.

The heating and air conditioning units are on the first floor with ducts carried through a hollow column in the center of the house. This column also carries the flues, electrical conduit, and sanitary piping, and is the only solid partition in the house.

Relationship of Heat Demand, Radiator Surface, and Steam Conditions

AN interesting table which shows the relation of various factors in a steam heating system has been devised by J. C. Hornung, engineer, Central Heat Appliances, Chicago.

The table, which appears below, assumes as standard conditions, a room temperature of 70°, an outside temperature of 0°, and a steam pressure of 0° or atmospheric in the radiator. This is shown in the block area of the table. The heat emitted under these conditions is taken as 100%.

Assume that a system is designed under the above "standard" conditions and that we wish to determine what conditions will exist when the outside temperature is 40°. Follow a horizontal line from the outside temperature scale at the right to the inside temperature column of 70°. The row of figures shows that the effective temperature would be 131° with a corresponding steam pressure of 26½ in. vacuum. The percentage of heat required would be 43% and the amount of active radiator surface, if placed on atmospheric steam pressure, would also be 43%.

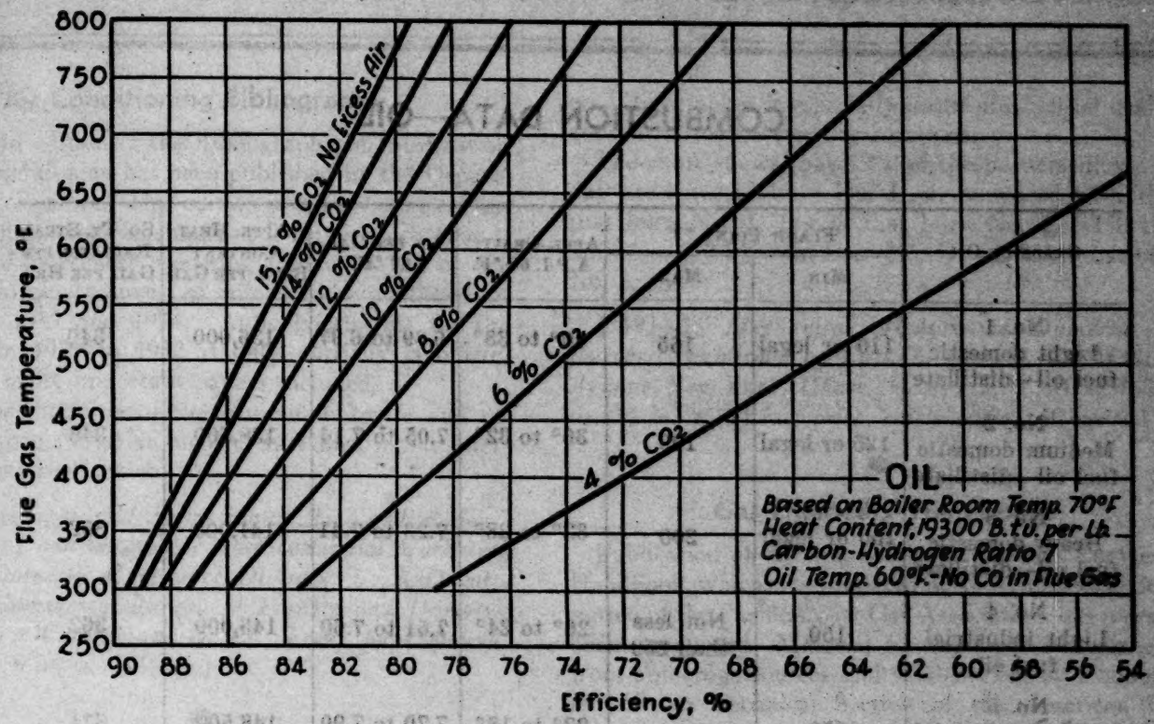
Now suppose that we desire to maintain only 60° in the room with the other conditions remaining the same as in the block area. The mean effective temperature would then be 182° with a corresponding steam pressure of 13¾ in. of vacuum. The heat required would be 87% of that at 70° room temperature and the radiator surface, assuming atmospheric steam pressure would be 81%. It may be noticed that with the above conditions, the heat required is 87% of that at 70° while the radiator surface is only 81%. This apparent discrepancy is due to the fact that as the temperature difference of the room and the radiator surface increases, the heat-emitting capacity of the radiator increases and less surface is required.

The table is based entirely upon the supposition that the heat supply is continuous and reveals clearly that the mean effective temperatures can be decreased only by lowering the pressure of the steam. If 20 in. to 25 in. vacuum is taken as the highest vacuum that it is possible to maintain in a heating system, then in many cases the heat will have to be shut off in order to avoid overheating. The heavy lines show approximately where, for any outside temperature, shutting off the steam will have to begin.

Possibilities of room cooling by lowering the temperature of the radiator are also shown. For instance, for an outside temperature of 80°, the room temperature could be kept at 70° by maintaining the mean effective temperature of the radiator at 50°. The minus signs indicate that the radiator would have to remove heat rather than supply it.

ROOM TEMP. →	40°				50°				60°				65°				70°				75°				80°			
OUTSIDE TEMP. ↓	MEAN EFF. TEMP. IN RAD.°	PRESSURE OR VACUUM	HEAT EMITTED %	RADIATOR SURFACE %	MEAN EFF. TEMP. IN RAD.°	PRESSURE OR VACUUM	HEAT EMITTED %	RADIATOR SURFACE %	MEAN EFF. TEMP. IN RAD.°	PRESSURE OR VACUUM	HEAT EMITTED %	RADIATOR SURFACE %	MEAN EFF. TEMP. IN RAD.°	PRESSURE OR VACUUM	HEAT EMITTED %	RADIATOR SURFACE %	MEAN EFF. TEMP. IN RAD.°	PRESSURE OR VACUUM	HEAT EMITTED %	RADIATOR SURFACE %	MEAN EFF. TEMP. IN RAD.°	PRESSURE OR VACUUM	HEAT EMITTED %	RADITOR SURFACE %	MEAN EFF. TEMP. IN RAD.°	PRESSURE OR VACUUM	HEAT EMITTED %	RADIATOR SURFACE %
-10	143	22"	73	60	172	18"	86	76	202	5½"	101	94	217	1½"	108	104	232	6¾"	115	115	246	13"	121	126	261	21"	128	128
0	122	26"	58	48	151	21½"	78	63	182	13¾"	87	81	196	8¼"	93	90	211	0"	100	100	226	4½"	107	111	241	10¾"	114	123
10	101	28"	43	36	131	24¾"	58	50	161	20"	72	67	176	16"	79	76	191	10½"	84	84	206	3½"	93	96	221	3"	100	100
20	81	29"	29	24	111	26¾"	43	38	141	24"	58	54	156	20"	65	62	171	18"	72	72	186	11¼"	79	82	201	6"	86	92
30	60	29½"	14	12	90	28¼"	29	25	121	26½"	43	40	136	24"	50	49	151	22¼"	58	58	166	18¾"	65	67	181	14"	72	77
40	40	29¾"	0	0	70	29¼"	14	12	101	28"	29	27	116	26½"	36	35	131	26½"	43	43	145	23"	50	52	161	20"	58	62
50	20		-13	-12	50	29½"	0	0	80	29"	14	14	95	28¼"	21	21	110	27"	29	29	125	26"	35	37	141	23¾"	43	46
60	-0		-28	-23	30	29¾"	-14	-12	60	29½"	0	0	75	29"	7	7	90	28½"	15	15	105	27¾"	21	22	120	26½"	28	30
70	-20		-43	-35	10		-28	-25	40	29¾"	-14	-14	55	29½"	-7	-7	70	29"	0	0	85	28¾"	7	7	100	28"	14	14
80	-41		-58	-44	-10		-42	-37	20		-28	-27	35	29¾"	-21	-21	50	29¼"	-14	-14	65	29½"	-7	-7	80	29"	0	0

COMBUSTION DATA—OIL



Explanation of Boiler Efficiency Chart

The boiler efficiency chart shown above gives the approximate efficiency for an oil furnace when the percentage of carbon dioxide and the temperature of the flue gas is known. For example, assume that a test shows the temperature of the flue gas to be 500° with a carbon dioxide content of 10%. Follow a horizontal line from the 500° point on the vertical scale to the 10% carbon dioxide line. Then drop a vertical line to the efficiency scale. The figure obtained, 82%, takes into account the heat loss due to excess air, flue gas temperature, and hydrogen combustion. It does not allow for the heat lost due to incomplete combustion, for moisture in the oil or air, or radiation. The first two losses seldom total more than 2½%, while the radiation loss may range from 3% to 20%. There are no methods by which this loss can be readily and easily computed. It is generally given a figure derived from experience and knowledge of the particular conditions surrounding the test.

Although this chart is based upon No. 3 domestic oil, it can be used for heavier or lighter oils if corrections are made. For a No. 6 oil the efficiency will be approximately 1% lower than shown on the chart, and for a No. 1 oil it will be 1% higher.

Approximate Color-Temperature Scale for Flames and Furnaces

Color	Temperature, °F.	Color	Temperature, °F.
Red visible in dark	750	Bright cherry red	1550
Red visible in daylight	975	Orange	1650
Blood red	1050	Light orange	1725
Dark cherry red	1175	Yellow	1825
Medium cherry red	1250	Light yellow	1975
Full cherry red	1375	White	2200

Published by Heating and Ventilating, 148 *Lafayette St., New York.* *Copyright, 1934, by* The Industrial Press.

COMBUSTION DATA—OIL

Grade of Oil	Flash Point °F.		Appr. Gravity A.P.I. 60 °F.	Lb. per Gal. 60 °F.	Appr. Heat Content B.T.U. per Gal.	Sq. Ft. Steam Radiator per Gal. per Hr.[1]
	Min.	Max.				
No. 1 Light domestic fuel oil—distillate	110 or legal	165	40° to 38°	6.89 to 6.97	136,000	340
No. 2 Medium domestic fuel oil—distillate	125 or legal	190	36° to 32°	7.05 to 7.14	138,500	346
No. 3 Heavy domestic fuel oil—distillate	150 or legal	200	32° to 28°	7.23 to 7.41	141,000	352
No. 4 Light industrial fuel oil	150	Not less than 250	26° to 24°	7.51 to 7.60	145,000	362
No. 5 Medium industrial fuel oil	150	—	22° to 18°	7.70 to 7.90	148,500	371
No. 6 Heavy industrial fuel oil	150	—	16° to 14°	8.01 to 8.12	152,000	380

[1]*Boiler Efficiency = 60%; Steam Radiator, 240 B.t.u. per sq. ft. per hr.*
Pour point for domestic grades recommended at 15° with minimum at 0°. For industrial grades, minimum is 15°.

Combustion Troubles

Smoke—Indicates imperfect combustion.

Cause: Lack of ventilation in boiler room; poor draft; improper air and oil adjustment; low fan speed; faulty atomization; improper grade of oil or low oil temperature of preheated oil.

High oil consumption.

Cause: Incomplete combustion and oil rates that are not properly proportioned to the load; inadequate or poorly installed radiation; inefficient boilers; boilers not proportioned to the load; maintenance of high room temperature; excessive draft.

Odor.

Cause: Incomplete combustion; gas leaks in furnace; oil leaks or spilled oil.

Published by Heating and Ventilating, 148 *Lafayette St., New York.* *Copyright, 1934, by* The Industrial Press.

Abstracts . . .

Reviews and Summaries of. . . . Current Papers, Books and Pamphlets

Air Conditioning Bibliography

The third edition of the Bibliography of Information on Air Conditioning has been published by the Department of Commerce. This edition is more valuable than the preceding issues inasmuch as it lists a much greater number of references, covering practically all of the more important sources of information published in the years 1933 and 1934. Although the list for the years from 1929 to 1932 is only partially complete, there are many important papers included.

It is the intention of the Bureau to revise and republish this material annually if sustained public interest warrants such action.

[*"Bibliography of Information on Air Conditioning," compiled by and obtainable from Industrial Marketing Section, Domestic Commerce Division, U. S. Department of Commerce, Bureau of Foreign and Domestic Commerce, Washington, D. C. Free; paper-bound; 45 pages; 8 in. × 10½ in.*]

●

Construction Industry Code Manual

A manual of information on the Construction Industry Code will shortly be published by the Construction League of the United States in order to keep the industry informed on developments in the code.

The information will be published in the form of a quarterly manual, supplemented weekly by the latest information on all divisions of the industry. Every three months a revised edition will appear which will combine all previous material.

[*"Manual of Information on the Construction Industry Code," published by the Construction League of the United States, 1741 New York Ave., N.W., Washington, D. C. First quarterly issue; approximately 140 pages; price $10 per year for four quarterly manuals and supplemental service.*]

●

Specifications of 324 Oil Burners

The fifth annual edition of the chart "Mechanical Analysis of Domestic Oil Burners" is now available. The chart lists for each of the 324 models the grade of oil used, its method of atomization, source of air supply, type of ignition, method of feeding fuel oil, and the major mechanical parts and controls. Also included is a table of the commercial standard fuel oil specifications.

Not only does the chart list all of the domestic and commercial burners sold today, but also many of those whose manufacturers have discontinued making burners. This makes it especially useful for fuel oil dealers and oil burner service organizations.

The chart shows that 55% of the burners in use today are listed to burn No. 3 oil, compared with 19% that burn No. 1, 13.6% that burn No. 2, 6.3% that burn No. 4, 3.5% that burn No. 5, and 2.3% that burn No. 6.

[*"1934-35 Mechanical Analysis of Domestic Oil Burners," published by Fuel Oil Journal, 420 Madison Avenue, New York. Chart, size 8½ in. × 50 in.; folded to 8½ in. × 11 in.; price, single copies, 50 cents.*]

●

Gas Engineers' Handbook

Publication of the first edition of the Gas Engineers' Handbook, which was prepared by the Handbook Committee of the Pacific Coast Gas Association, has recently been announced. Material for the book was gathered from numerous sources and was checked by a committee of the Technical Section of the American Gas Association.

The handbook is arranged in the form of eight sections, entitled as follows: mathematical and conversion tables; properties of elements, common substances, and engineering materials; properties of gases, air, steam, and water; fuels and combustion; production of gas; testing and measurement; transmission and distribution; utilization of gas.

The first three sections are unusually complete and include, besides the usual tables, many others which have not been gathered into one book before. There are numerous charts and graphs which will save considerable time in engineering calculations.

Included in the fuel and combustion section are many tables and formulas of the properties of solid, liquid, and gaseous fuels. The combustion division of the section is devoted mainly to gaseous fuels and covers practically all fuels in this classification. Much valuable data on heat transfer are also given in this section.

Centrifugal pumps and fans are reviewed in a clear and concise manner in the production of gas section, while the testing and measurement section has considerable data on gas analysis, pyrometry, flow of fluids, and measurements.

Phases of heating and air conditioning which interest gas engineers are covered in the utilization of gas section. Some of the divisions are pipe layouts, flues and chimneys, gas water heating, heating and air conditioning systems, and burner design.

[*"Gas Engineers' Handbook," published by McGraw-Hill Book Co., Inc., New York; cloth-bound; size 6 in. × 9 in.; 1017 pages; price $7.50.*]

EDITORIALS

Facts

ELSEWHERE in this issue we print the principal statistical data on air conditioning as published recently by Edison Electric Institute. Covering the principal cities, these figures show better than any previously available the progress made in getting the public to use air conditioning. In spite of the fact that statistics are usually dry reading material, we believe that these tables are well worth careful attention and close study. The figures showing electrical consumption and hours of use per year not only help to fill in gaps in the published information, but are of direct practical usefulness as aids in arriving at estimates of operating cost.

●

Fuel Prices

THE fuel price situation, always interesting because of the narrow margins between competing fuels in most localities, is particularly live now because of the NRA codes. The oil-producing interests under their plan have practiced curtailment of production with the deliberate idea of forcing a rise in prices. Oil prices have risen sharply in some localities, carrying fuel oil along. So far, prices of coal and gas have not increased proportionately. Whether or not they will do so is an open question. Everyone who either has to specify new fuel equipment or pass on the fuel to be used next season in an existing plant, will certainly do well to look carefully into the situation. It is not a simple one and so far as we can see, there is neither a general solution nor very much on which to base an intelligent decision. Quoted prices are for short periods, and this in itself indicates the feeling of uncertainty as to what may happen.

●

The Code for Engineers

AN NRA code for engineers is fading into the realm of forgotten things. The problem of drawing up a suitable one proved unexpectedly troublesome. Draft after draft has been discarded as unsuitable. Putting down on paper the duties and functions of an engineer even in the construction industry has proved almost impossible. There seems to be good sound reason why there should be no code, and there is a steadily growing opposition to codifying at all.

Out of the discussion and all the work put in on a code, there seems also to be a growing understanding of the function of the professional engineer. A movement has resulted looking toward an all-inclusive organization to oversee the business and professional interests of engineers. It is almost too much to hope that such an organization can spring into full bloom, but it seems certain to arrive finally. If the code discussions help to speed the day of its arrival, they will not be a total loss.

●

Competition in Modernizing

PASSAGE of the National Housing Act opens up more direct opportunities for all of us than has any single move made in the past two years. The act undoubtedly holds the possibility of reviving the mortgage on real estate as a favored investment. It also makes a considerable sum available on easy terms for modernizing within the next 18 months. The modernizing gives promise of producing the quicker results while the effects of a renewed interest in real estate as an investment for long-term funds should follow.

We must not lose sight of the fact that all the passage of the act does, however, is to create a set-up or machinery which *can* be made advantageous to us. In order to realize on the possibilities, we ourselves must be ready and anxious to help in carrying out the plan, and ready to enter the fight for actual work. Especially on the modernizing side, there is every indication that the fight will be real. Everyone wants to get in on this modernizing. Heating, ventilating and air conditioning will have to compete against the appeal of paint, decorating, plumbing, and structural modernizing, all of which have their own appeal. Their appeal will be added to the usual competition which is with us all the time. Whatever modernizing we succeed in getting will come only after a struggle and only because we are able to offer something more badly wanted than the other fellow can offer.

In the period while general plans are forming and the administration is being organized, we ourselves ought to be getting prepared. We can overlook no possibilities, for if we expect to really benefit by the act we will certainly have to have our own plans ready. Our general idea is sound, necessary, and carries inherent appeal. Equipment is well developed and priced within reason. What remains is to keep informed, keep in step, cooperate, be ready, and go after our share aggressively.

NEWS OF THE MONTH

Air Conditioning Installations Increasing Rapidly This Year, Utility Reports Show

CHICAGO—According to the Commonwealth Edison Company, 26 Chicago theaters have been air conditioned this year, making a total of 99 conditioned amusement houses so treated out of a total of 285 in this city.

An analysis of the data covering 48 theaters shows that these theaters have a total of 7742 tons of refrigeration; a connected horsepower for summer cooling of 13,671; a total seating capacity of 114,421, and an average of 14.78 seats per ton. The range of seats per ton was from 10 to 21. These cover theaters with a general average of 200 to 3000 seats. In one case there were 28 seats per ton. This theater was one of the first to use refrigeration for cooling.

Air conditioning installations in Chicago as of about June 1 are:

Theaters	99
Restaurants	78
Private offices	70
General offices	35
Hotels	20
Residences	23
Bakeries	18
Candy Mfg.	27
Printing	16
Banks	6
Brokers and Exchanges	8
Beauty Shops	2
Churches	2
Clubs	4
Miscellaneous stores	8
Radio studios	2
Morticians	7
Dance halls	6
Dentists	2
Drug stores	3
Hospitals	4
Candy stores	5
Food stores	6
Apparel stores	15
Century of Progress	33
Miscellaneous	12

BALTIMORE—Ninety-six air conditioning installations were on the lines of the Consolidated Gas, Electric Light & Power Company of Baltimore as of June 1. Theaters, office buildings, restaurants, and specialty shops make up the greater part of the load. The tabulation of the installations follows:

Business	No. of Installations
Theaters	18
Restaurants	14
Banks	8
Specialty shops	12
Department stores	3
Industrial	9
Offices	15
Hospitals	3
Funeral parlors	2
Library	1
Lecture halls	2
Residences	9

Of these, 66 were made prior to 1934.

PHILADELPHIA—There were 197 air conditioning installations on the lines of the Philadelphia Electric Company as of April 30, 1934. Twenty-seven of these were added since January 1, 1934.

The following tabulation shows the number of installations added to the lines during 1934:

Business	No.
Hospitals	1
Restaurants	3
Stores	2
Industrial	6
Schools	14
Theaters	1

Installations made prior to December 31, 1933 are:

Mechanical Refrigeration	
Banks	3
Office building	1
Country club	1
Funeral parlors	3
Hospitals	2
Offices	25
Restaurants	12
Stores—small	16
Stores—department	2
Theaters	13
Industrial	31
Refrigeration Produced by Steam	
Auditorium	1
Radio studio	1
Cooling by Evaporation	
Auditoriums	2
Museums	1
Restaurants	1
Schools	5
Theaters	10
Humidification in Industries	
Textiles	12
Others	13
Ice Used for Refrigeration	
Funeral parlor	1
Restaurants	2
Theaters	2
Total	160

CHICAGO—Thirty-four air conditioning installations are reported by the Public Service Company of Northern Illinois as having been installed in 1933. Of these, 14 were in residences, 11 in stores, and 6 in theaters. The number of systems on the company's lines as of January 1, 1934 were:

Business	Number	Hp.
Offices	1	1½
Restaurants	5	98½
Residences	21	86
Stores	14	242½
Theaters	24	1936
Funeral homes	1	3½
Industrial	6	1815
Total	72	4183

SAN FRANCISCO—Air conditioning installations added to the lines of the Pacific Gas & Electric Company in 1933 and up to May 1, 1934, include:

Business	No. of Installations	Hp.
Photographic laboratory	1	7½
Hair dressing parlor	1	10½
Department store	1	3
Clubs	3	9½
Theater	1	12
Chocolate factory	1	7½
Banana storage room	1	35
Residences	3	4
Restaurant	1	5

Installations made prior to the beginning of 1933 are as follows:

Business	No. of Installations
Banks and office buildings	65
Bakeries	17
Restaurants	16
Churches and clubs	6
Stores	14
Dairies and wholesale fruit	5
Funeral parlors	1
Hotels	10
Hospitals	6
Industries	10
Lodges	3
Milk depots and markets	15
Museum	1
Poolrooms	1
Prisons	1
Railway depot	1
Schools	5
Theaters	28
Miscellaneous	7

PITTSBURGH—Building activity in the Pittsburgh district has definitely taken a new trend toward inclusion of air conditioning equipment, as revealed in a survey of the territory.

Fifty-six plants are now in operation or are in process of being installed.

Establishments which have installed air conditioning since the first of the year include Burt's Shoe Store, Continental Bar, Stouffer Lunch, Inc.; one restaurant; Star Restaurant, McKeesport; Hagan Corporation executive office, the Pittsburgh Sun-Telegraph executive office, and two offices in the Grant Building.

Installation is proceeding in Childs' Restaurant, Joseph DeRoy & Son, and the H. J. Heinz Company executive office.

NEWARK—Use of air conditioning equipment in commercial buildings has shown a large growth in Newark in recent years, a Public Service survey shows. Nineteen business concerns in this city, including five restaurants, two banks, three motion picture theaters, four business offices, and five stores have been equipped for summer comfort cooling.

Gas Conversion for $155

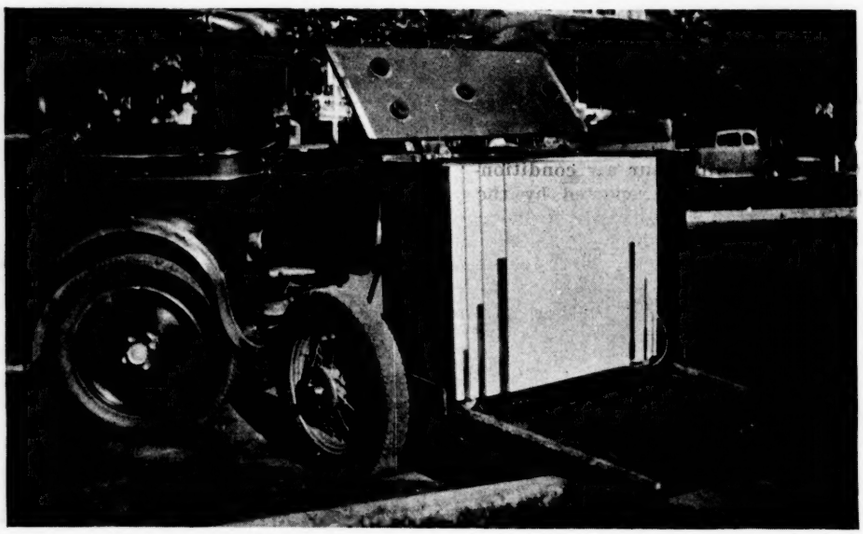
BALTIMORE—The Gas & Electric Company of this city is making a special drive on gas conversion burners and is advertising a complete installation of these units for $155. The company claims that only 400 burners are on hand and that when these are installed, the price will be raised.

Terms are a down payment of $10 and a monthly rental of $4 after October. Use of the burner can be discontinued any time prior to May, 1935, and further charges cancelled.

Trailer Transports Room Cooler for Demonstration

SACRAMENTO—Deciding to take the product to the prospect, Electric Equipment, Inc., which hand'es G.E. air conditioning equipment, has designed a small trailer, and has since been busy transporting a G.E. portable room cooler around the Sacramento Valley, making demonstrations in small rooms and offices. The salesmen plug in an electric cable, hook up a flexible water connection, and give a practical demonstration of air conditioning.

The outfit, built at a cost of about $50, uses two wheels with a spring and suspension similar to that which was used on the front of the old Model-T Ford. On this equipment is mounted a case constructed to make the cooler easy to handle. Space at one end is provided to hold the electric cable and flexible hose. Heavy felt pads, about the size of a large doughnut, hold the cabinet in place and protect it during transit. The back of the trailer, when laid down, acts as a convenient unloading platform.



Demonstrator trailer for displaying room cooler

A.C. in High Altitudes Discussed at A.S.M.E. Semi-Annual Convention; Special Equipment for Such Altitudes Urged

DENVER, COLO.—Automatic heating and air conditioning were given a place in the program of the four-day semi-annual convention of the American Society of Mechanical Engineers held in Denver, June 25-28.

"Humidity and Air Conditioning in High Altitudes" was the subject of a paper presented by Dan J. McQuaid during the two-hour "Heat Engineering" session the second morning of the convention. The other principal speaker at this session was Robert F. Thorne, who discussed "Burning Pulverized Lignite."

Mr. McQuade, representative of the Taylor Instrument company in Denver, criticized makers of air conditioning equipment for their failure to make a scientific study of climatic conditions in high altitudes and then adapt their product to those specific conditions.

"Of course the Rocky Mountain region has been slow in accepting the idea of air conditioning," he said. "But the reason is not backwardness. It is because manufacturers have been trying to thrust down our throats equipment designed to control air conditions at sea level, which fails to produce results at high altitudes."

The average barometer reading for Denver is only 24.6 in., he pointed out. That means that more water and a greater volume of air is needed to maintain proper temperature and humidity. In order to meet this need, equipment must be designed with a greater capacity than that used at lower altitudes. When that is done, he predicted, the Rocky Mountain region will become a ready market.

Mr. McQuade presented several graphs, the result of extensive research, to support his contention that a person is affected by the total heat in the air, as measured by the wet bulb, rather than the temperature of the air, as measured by the dry bulb.

In closing, Mr. McQuade urged members of the association to take advantage of laws existing in 28 states for the licensing of engineers in order to place the heating and ventilating engineering on a higher plane. Too many salesmen, without technical training, are representing themselves as air conditioning experts, he asserted.

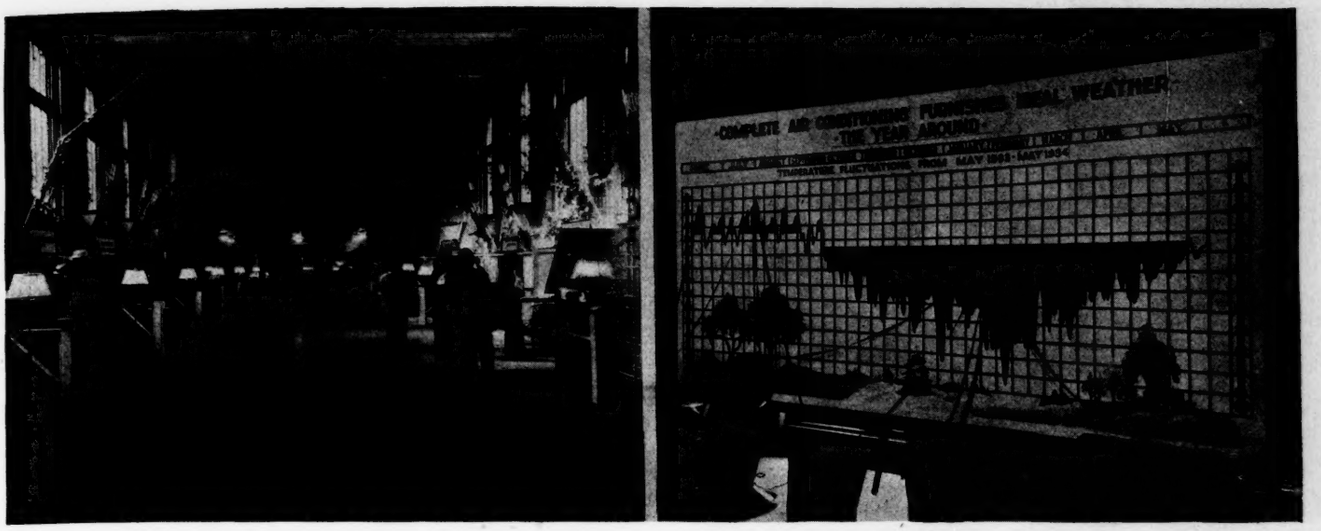
Mr. Thorne, superintendent of steam production, Public Service Company of Colorado, presented a resume of the problems arising in preparing and burning pulverized lignite coal from the northern Colorado fields and the methods being used by his company to cope with them.

The tendency of the coal to ignite while being ground is partially met by soaking it for about 20 days, thus raising its moisture content to about 30%. Even then, it ignites within 30 min. in a 286° temperature and will burn like punk without any external application of air, drawing upon its own high oxygen content.

G. W. Carter and S. Clarke Jacobsen, University of Utah students, presented a paper and projection slides to describe a process they have worked out for producing smokeless fuel from lignite coal. It consists of distilling volatile matter, using superheated steam—about 1 lb. of steam to 1 lb. of coal. The fuel produced in their plant at the university was found to have 15% greater heating efficiency than the original coal. It deposited only one-hundredth as much solid matter as the raw coal during combustion.

They estimated a plant costing $75,000 could pay 7½% interest a year, in addition to writing off the investment in the first five years. This was based upon estimated sales of only the smokeless fuel, and two of the by-products, artificial gas, and gasoline. Other by-products are crude oil, fuel oil, and kerosene.

The subject of smokeless fuel appropriately followed a discussion Monday morning of "Dust and Cinders from Chimneys," led by H. O. Croft, head of the mechanical engineering department of the University of Iowa. He pointed out that smoke nuisance from industrial sources has materially decreased in recent years, but that residential sources have increased. He said that elimination of this menace to health and beauty constituted a challenge to the engineers of the country.



(Left) Summer air conditioning section of the Newark air conditioning show. (Right) A chart to show the layman why air conditioning is needed the year 'round, and the equipment for accomplishing the various functions.

5000 Attend Air Conditioning Show Held by Utility in Newark

NEWARK, N. J. — An air conditioning show sponsored by Public Service Electric & Gas Company was held here June 4-9. The purpose of the show was to acquaint homeowners, prospective homeowners, architects, builders, heating contractors, electrical contractors, owners of stores, restaurants, theaters, barber shops, and offices with the equipment available for air conditioning. Approximately 5000 attended.

The exhibit was advertised chiefly by a direct-by-mail campaign to selected groups. Invitations accompanied by two tickets to the show were sent to approximately 65,000 persons. About 75% of the invitations went to owners of better class single-family dwellings. These invitations were mailed during the week preceding the show. Tickets were also distributed through exhibitors, heating contractors, service clubs, architect associations, and company employes.

Publicity for the show was also secured through the medium of six newspaper advertisements. Three of these advertisements appeared during the week prior to the show and three during the week in which the show was in progress. News releases sent to local newspapers were also used to build up interest in air conditioning while the show was on.

The show was divided into two sections. One section was devoted to equipment designed primarily for summer air conditioning, and the other to equipment for complete winter air conditioning, and for automatic gas heating. This arrangement was made so as to keep certain types of equipment together and thereby avoid confusing visitors by showing a mixture of heating, cooling, humidifying, and dehumidifying equipment in the same or in adjacent booths. However, care was taken to show visitors, by means of educational exhibits, that the equipment for summer and winter air conditioning could easily be used together to do a year-'round air conditioning job.

The equipment displayed in the summer section consisted of self-contained and remote unit room coolers, store units, attic ventilating fans, ice coolers, suspended units and compressors of various types and sizes. Practically all of this equipment was in continuous operation during show hours. No attempt was made to completely air condition the display space, but the operation of the cooling units did keep this section reasonably comfortable.

The winter section was devoted to a display of complete, winter air conditioning systems, automatic gas burners, gas-designed boilers and humidifiers. All heating and humidifying equipment shown in this section was gas-fired. Three displays of insulation and a display of storm sash and weatherstripping also were included in this section.

One of the displays that attracted unusual interest was a comparative analysis of investment and operating costs for the various fuels used in automatic heating. The display pointed out what could be accomplished for approximately the same investment with gas, oil, and coal.

An auditorium seating about 100 people was used throughout the show for special group meetings, and for the showing of talking pictures which traced the history of air conditioning from its early days to the present time.

A list of the companies exhibiting included: Frigidaire Sales Corporation; Mumford-Hinrichsen, Inc.; York Ice Machinery Corporation; Air Conditioning Corporation; Carrier Engineering Corporation; The Abbott Company; The Bryant Heater & Manufacturing Company; Graybar Electric Company, Inc. (Ilg Electric Ventilating Company); Surface Combustion Corporation; Campbell Metal Window Corporation; Rock-Wool Insulating Company of New Jersey; Home Insulating Company of New Jersey; Johnson & Kirkam, Inc.; American Gas Products Corporation; General Gas Light Company; Kelvinator Sales Corporation; New Jersey State Association of Master Plumbers; John C. Fullerton, Inc.; Rudy-Tyler Sales Company; Henry Furnace and Foundry Company; Fox Furnace Company, and Baker Ice Machine Company.

Holman Manager of Timken Branch

BOSTON—Lawrence H. Holman has recently been appointed manager for the Timken Silent Automatic oil burner branch office here. To a meeting of the branch staff he made the announcement that Timken is soon to market a complete line of air conditioning equipment, which will take care of every requirement of the home, from heating and cooling to humidifying, dehumidifying, and air cleaning. Some of this new equipment will be on the market by early in July and much more before the end of the year.

Enlarges Showroom

LYNN, MASS.—The North Shore Electrical Equipment Company of this city has enlarged its showroom space to accommodate a complete line of General Electric air conditioning equipment. Harry Whitten, who is also an automobile dealer, is the proprietor, and L. V. McDuff is sales manager.

21 A.C. Manufacturers Exhibit in Boston

BOSTON—This city's first air conditioning exposition which opened June 4 in the Edison Building continued to June 30, with 21 manufacturers and distributors of various types of equipment exhibiting. Those having booths were:

Air Conditioning Engineering Company, maker of "Perfectaire" equipment for homes and offices; Air Conditioners, Inc., distributor of Gar Wood conditioning equipment; American Filter Company, manufacturer of air filtration systems; Boston Ice Company - Metropolitan Ice Company, distributors of equipment involving the use of ice; Bon-Air Radiator Corporation, humidifying and air conditioning systems; Buckley & Scott, distributors of Westinghouse air conditioning system, Electrol, and Buckley & Scott oil burners; Carrier Engineering Corporation; Cooling and Air Conditioning Corporation, division of the B. F. Sturtevant Company, manufacturer of blowers, ventilators, etc.; Curtis & Brock, Inc., C & B conditioned air systems for homes and stores; General Heat and Appliance Company, distributor of Frigidaire systems and Delco oil burners; H. C. Guterman, distributor of "Airguide" humidity indicator; Hickey & Company, cooling and air conditioning equipment for homes and stores; Ilg Electric Ventilating Company, industrial and commercial equipment; Johns-Manville Sales Corporation, insulation for buildings and equipment; Lawton Engineering Company, distributor of General Electric oil furnaces and air conditioning equipment; Minneapolis-Honeywell Regulator Company, temperature and humidity control systems; Parks Cramer Company, maker of humidifying and air conditioning systems; Petroleum Heat and Power Company; Petro and Nokol oil-burning systems; A. A. Troiani, distributor of Fulton-Sylphon and Friez control instruments; York Ice Machinery Company, cooling and air conditioning systems.

The exhibition as a whole was attractive. While no great crowd attended, none was expected, and none was wanted. What the exposition did get was a considerable number of people really interested, who came to see if the exhibitors had something that would solve their individual problems. These included business men with large suites of offices, manufacturers, store proprietors, restaurant owners, and others who needed air conditioning of one kind or another, and felt that their business would be helped by its installation.

The exposition was conducted under the auspices of the Air Conditioning Bureau of Boston, under the direction of Daniel Ricker, secretary. Arrangements for the show were completed by a committee headed by Harry C. Mayor of the Lawton Engineering Corporation. Forrest Paige and R. R. Robertson, bureau members, were in attendance.

It has been decided to keep the exposition open during the month of July, although it was originally planned only through June. The exhibitors felt that it was well worth while, however, since several sales have been reported, and many good prospects' names have been secured. Public interest in the show has been quite general, with attendance of a desirable type.

Mahon Opens Chicago Office

DETROIT—The R. C. Mahon Co., Detroit, has established a sales engineering office at 231 S. LaSalle St., Chicago. This office, headed by Walter F. Sheetz, vice-president of the company, will give the Mahon organization direct contact in the midwest area and will provide engineering service and closer cooperation for the many industries served by Mahon in that territory.

Part of the Boston air conditioning show held in the Edison Building

Register Code Approved

WASHINGTON—NRA Hugh S. Johnson approved on June 28 the code of fair competition for the warm-air register industry.

The code, effective Monday, July 9, provides minimum hourly and weekly rates of 40 cents and $15, respectively, for factory and clerical workers and establishes a 40-hr. maximum work week with a provision for six 48-hr. weeks in any 6-month period to cover peak periods. A code authority of three persons to be chosen by a majority vote of the members of the industry is created and it is empowered to submit a budget for its own support to the Administrator for his approval.

Open price lists are to be filed with the code authority but in his order approving the code, General Johnson ordered the deletion of a clause permitting members of the industry to sell to certain of their largest customers at any terms and discounts they desired irrespective of price lists. He also ordered a stay pending his further order of the clause providing for a waiting period between the date of filing and effective date of price lists.

Refuses O. B. Service Charge Increase

NEWARK—The New Jersey State Recovery Administration has denied the application of the State Code Authority for the Fuel Oil Industry for permission to increase the service charge on oil burners from $10 to $20 a year. The application was opposed by Frank A. Boettner, representing the Economy Service of East Orange.

Boettner declared a fair profit was derived from the $10 service charge. He maintained the charge should not be increased because the national code contains a $10 service charge. He said an increase in the charge would be interpreted as an attempt to utilize the state code to gouge the users of fuel oil.

Harbula Moves

CHICAGO—M. G. Harbula and Associates, consulting air conditioning engineers, have moved their offices to 303 Gary Ave., Wheaton, Ill. Mr. Harbula invites manufacturers to send him their latest catalogs.

Mr. Harbula reports that his organization has been retained by Sears Roebuck & Company as consulting engineers and advisors on the air conditioning for the new $1½ million windowless department store now being erected on the site of the old Becker Ryan store at 63rd and Halsted Streets.

Terms of Sale for Steel Boiler Industry Approved

WASHINGTON—National Recovery Administrator Hugh S. Johnson, it was announced June 1, has approved the terms of sale for the steel tubular and firebox boiler industry as submitted by the executive committee of the Steel Heating Boiler Institute, the industry's code authority. The terms specified are:

"Net cash 30 days or 5% discount for cash within 15 days from date of invoice. The net amount of the invoice is to be determined by deducting all freight allowances from the net quoted prices. On all past due accounts legal rate of interest."

May Driest Month on Record

NEW YORK—May, 1934, was the driest ever at most stations of the Weather Bureau from northern New England to New Mexico. The total rainfall at Boston was only half normal; at Pittsburgh, a fifth; at Chicago, a seventh, and at St. Louis, an eighth of normal.

Only one area of low barometer of cyclonic propensities crossed the country in May. Instead of rain, this storm spread millions of tons of dust everywhere from the Rocky Mountains to the Atlantic Ocean.

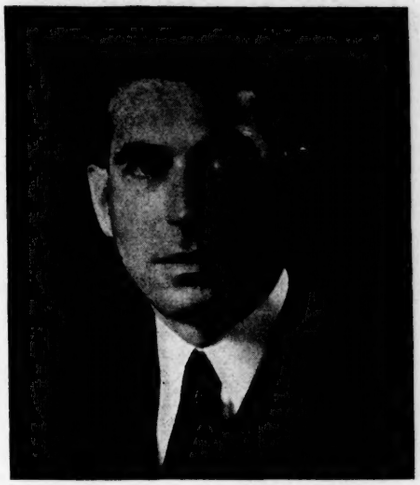
Areas of high barometer predominated, causing warm, sunshiny weather. During the first 10 days, the temperature averaged 7° above normal at Boston, 8° at Pittsburgh, 9° at St. Louis, and 15° at Chicago. (The normal temperature at Boston and Chicago for May is practically the same, 57°.) Another period of warm weather set in near the end of the month, when the following high temperatures were recorded:

Dallas	94
St. Louis	96
Kansas City	103
Omaha	103
Des Moines	105
Bismarck	102
Miles City, Mont.	101
Huron, S. D.	106
La Crosse, Wis.	107
St. Paul	106
Chicago	98
Indianapolis	94

Warm, dry winds had a parching effect and spread peril of fire and thirst.

Petersen Resigns

MILWAUKEE — Automatic Products Company, manufacturer of automatic control equipment, announces that Arnold E. Petersen has resigned as sales manager.



Julius Daniels, president of the Air Conditioning Bureau of Boston

Boston A. C. Bureau Hears Drinker and Files

BOSTON—Approximately 200 attended the June dinner of the Air Conditioning Bureau of Boston in the new air conditioned grill room of the Hotel Bradford. Among the guests were many engineers from New York, Philadelphia, Hartford, and Providence.

Following the dinner the meeting adjourned to the auditorium of the Edison Electric Illuminating Company to attend a "house cooling" of the auditorium—the opposite of a "house warming." This room has just been equipped with air cooling.

Julius Daniels presided and introduced Prof. Philip Drinker of the Harvard School of Public Health, who gave a talk on research and experiments in health at the school. He was followed by John Files, general manager of the Frigidaire Sales Corporation of New England, who gave a short talk on air conditioning.

Following a comedy skit, the meeting adjourned to the Air Conditioning Exposition. Attendance at the Exposition has averaged 200 persons a day since it opened.

High School to Teach Air Conditioning

CHICAGO—Announcement was made June 9 that the Chicago Board of Education is seriously considering the inauguration of a course in air conditioning at the Lane Technical High School. If this were done it would be the first high school course on this subject in the world.

Brooks Heads Airtex

EAST ORANGE, N. J.—Edward F. Brooks heads the newly-organized Airtex Co., 519 Main Street, which will deal in air conditioning equipment.

Penn Switch to Hold Dealer Meetings

DES MOINES—A series of one-day meetings for automatic heat dealers is being planned by the Penn Electric Switch Company. A. L. Ruble, Boston representative of the company, will hold the first meeting about the middle of July, for all Maine dealers. The meeting is scheduled for Portland.

At each meeting, the principles and application of the new Penn Temtrol will be presented by means of illustrated charts. It is hoped, through the meetings, dealers will secure a more thorough understanding of all automatic control problems in order that they may simplify installation and service work and assure greater operating efficiency of the heating equipment they sell.

The Maine meeting will be followed with special meetings in metropolitan areas just as quickly as arrangements can be completed.

Holland Opens Boston Branch

BOSTON—A factory branch of the Holland Furnace Company has been opened at 893 Boylston St., Boston, with E. A. Albrecht as district manager.

Perfex Reorganizes

MILWAUKEE—Perfex Radiator Company has been formed to take over the business and assets of the Perfex Corporation, pioneer builders of heat transfer products, including unit heaters, concealed radiation, and blast cores used by the heating and ventilating trade. Julius K. Luthe is president and treasurer of the new company.

Mr. Luthe was formerly president of the Time-O-Stat Controls Company up to the time that it was merged with the Minneapolis-Honeywell Regulator Company, of which Mr. Luthe was vice-president and director. Robert W. Wilson, who was vice-president and general manager of the old Perfex Corporation, continues as a vice-president and director of the successor company.

L. A. Burch, formerly with the Carrier Corporation in Wisconsin following eight years with the Buckeye Blower Company, is in charge of Heating Division products, consisting of unit heaters, coolers, blast cores, concealed radiators, condensers and evaporators for air conditioning work.

An extensive program to improve and enlarge the present line of products through engineering research and development is planned, in charge of H. Thoen, development engineer, who has a background of many years' experience in heat transfer development work.

Hackett New Housing Director

WASHINGTON—Col. H. B. Hackett, general manager of the Public Works Emergency Housing Corporation, was made director of housing of the corporation June 16. His appointment followed the resignation of Robert D. Kohn as director of the Housing Division.

WASHINGTON—Nine officials and minor employes of the Public Works housing division resigned in the middle of June following the resignation of Robert D. Kohn, director. The group includes Max Dunning, assistant director; R. K. Chase and C. P. Grimes, of the legal staff, and J. M. Hamilton, Eugene H. Klaber, A. C. Shire, F. L. Smith, and Oliver C. Winston.

McCormick Appoints Washabaugh

WILLIAMSPORT, PA.—J. H. McCormick & Company, manufacturer of air conditioning, humidifying, and gas house-heating equipment, has announced the appointment of S. M. Washabaugh as general sales manager. For the past 10 years Mr. Washabaugh has been in the general sales department of Spencer Heater Company.

McCormick also announces the appointment of G. T. Peifer, formerly with Spencer Heater Company, as its district representative located at 334 Fourteenth St., Buffalo.

Tubing Company Formed

BOSTON — A newly organized corporation, the United States Brass & Copper Company, has purchased from the Draper Corporation a large plant in Hyde Park, Mass., valued at $125,000. Here will be manufactured a full line of seamless brass, copper, and aluminum tubing and pipe for steamfitting, gas, and other purposes, as soon as machinery can be installed.

John J. Dervan, formerly treasurer of the oldest seamless brass and copper tube company in the country, is president and treasurer of the new corporation, and John B. Kennedy assistant treasurer. Joseph T. Dervan is secretary.

Mr. Kennedy is also sales manager.

Ross with Republic

BOSTON—John G. Ross, formerly with the Reading Iron Company, is now representing Republic Steel Corporation, with headquarters at 250 Stuart Street.

Savage Arms Enters Air Conditioning Field with Unit Washers and Coolers

NEW YORK—Savage Arms Corp., Utica, N. Y., one of the country's largest manufacturers of firearms, has entered the air conditioning business, having taken over the manufacturing, merchandising activities, and personnel of Air Conditioning Industries, Inc., former manufacturer of Zephyr Air equipment. The air conditioning business of the corporation will be carried on as the Air Conditioning Division of the Savage Arms Corporation. Sales offices are located at 100 East 42nd St., New York, while engineering and production will be handled from the plant at Utica.

W. D. Jordan, formerly president of Air Conditioning Industries, Inc., who has been associated with the development of Zephyr Air equipment since its inception, is manager of the new division, while P. D. Van Vliet is chief engineer.

Equipment at present on the market include the Zephyr 60 and 60A (see New Equipment pages, this issue) both of which are self-contained, cabinet units, the former equipped with refrigeration. The line also includes the Zephyr 85, 86, and 88, which have refrigerating capacities of from 1¼ to 5 tons. These units are for installation in enclosures in the space served or at some remote point, with ducts, and have provision for heating coils.

Distribution will be through distributors and dealers with exclusive territory rights. Plans have been completed for merchandising the equipment along the southern part of the eastern seaboard, and by the end of the summer it is expected that distributorships will have been assigned in the north central and New England states. National coverage is expected to be reached by next summer.

Savage is the third large munitions maker to enter the air conditioning field in some of its phases, Winchester having manufactured an extended heating surface for a number of years. Du Pont more recently became connected with air conditioning through its introduction of freon refrigerants.

Walsh Heads G. & B. Sales in Boston

SPRINGFIELD, MASS.—Joseph F. Walsh, former sales engineer of the Boston area for the Gilbert & Barker Manufacturing Company, has been promoted to take charge of all company operations in the Boston metropolitan district.

The program in his area included the opening of a branch in Salem under the direction of Frank Blackwell, which will handle sales on the North Shore.

A second new branch was opened recently in Andover, under the supervision of Harold E. Mather, and covers the entire Merrimac Valley.

Smoke Abatement Exhibit Opened at Fair

CHICAGO—Exceeding in both scope and dramatization any like presentation ever undertaken, the Chicago Smoke Abatement World's Fair Exhibit, which opened in the General Exhibits Building about June 20, bids fair to claim its full share of the 1934 visitors to A Century of Progress.

Cooperating in the exhibit are: Committee of Ten of the Coal and Heating Industries, Iron Fireman Mfg. Company, Detroit Stoker Company, Kewanee Boiler Corporation, Illinois and Indiana coal operators, Pocahontas Operators' Association, Chicago Coal Merchants Association, Appalachian Coals, Inc., National Coal Association, McClave-Brooks Company, and others.

Prominent in the exhibit is a boiler shell of a steel heating boiler, 7 ft. high, 8 ft. long, oval in shape, with all attachments, and capable of demonstrating all operations. This boiler shell is the moving picture projection house for the display and, with the screen located in the furnace door, the picture will be projected from the inside through the door. The films will show actual smoke conditions, grades of smoke, combustion of the different types of fuel in different kinds of equipment, furnace operations, industrial conditions, obstacles to smoke abatement progress, and the like.

Paget with Swartwout

CLEVELAND — A change in the personnel of the Ventilation Division of The Startwout Company has placed B. K. Paget, formerly of Scranton, Pa., in charge of ventilator sales, with headquarters at Cleveland.

Mr. Paget was formerly connected with John J. Nesbitt, Inc., and the L. J. Wing Mfg. Co., New York, in heating and ventilating sales work.

Form Contracting Firm

NEWARK—The Newark Heating & Ventilating Company, contracting firm, has been formed, with T. Mancusi-Ungaro as agent. The firm is capitalized at $125,000.

PWA Requirements Amended

WASHINGTON—Construction Regulations of the Federal Administration of Public Works, Bulletin No. 2, issued in revised form March 3, have been amended. The fol'owing paragraph shou'd be inserted in lieu of subparagraph (i) of paragraph 2 of the Regulat'ons:

"Engineers, architects, and other professional and subprofessional employees engaged in duties normally done at the site of the project shall receive at least the prevailing rates for the various types of service to be rendered, provided that in no case shall professional employees receive less than the following weekly compensation for 40 hours or less irrespective of the number of hours employed: $36.00 in the northern zone; $33.00 in the central zone; and $30.00 in the southern zone. Where the working week is longer than 40 hours, weekly compensation shall be increased proportionally. Compensation under this paragraph shall be subject to the approval of the Government Engineer."

The following paragraph should be inserted in lieu of Paragraph 9 (a) of the Regulations:

"9 (a)—N.R.A. Compliance.—The contractor shall comply with each approved code of fair competition to which he is subject, and if he is engaged in any trade or industry for which there is no approved code of fair competition, then as to such trade or industry with an agreement with the President under Section 4 (a) of the National Industrial Recovery Act (President's Reemployment Agreement), and .....
(the Borrower)
shall have the right, subject to the approval of the Government engineer, to cancel this contract for failure to comply with this provision and make open market purchases or have the work called for by this contract otherwise performed at the expense of the contractor. So far as articles, materials or supplies produced in the United States are concerned, no articles, materials or supplies shall be accepted or purchased for the performance of the work nor shall any subcontracts be entered into for any articles, materials or supplies, in whole or in part produced or furnished by any person who shall not have certified that he is complying with and will continue to comply with each code of fair competition which relates to such articles, materials or supplies, and/or in case there is no approved code for the whole or any portion thereof then to that extent with an agreement with the President as aforesaid."

The Regulations apply to Public Works projects only.

Lawrence S. Hamaker

Steel Man Promoted

YOUNGSTOWN—Lawrence S. Hamaker, sales promotion manager of the Republic Steel Corporation, has been promoted to the post of vice-president and general manager of the Berger Manufacturing Co., Canton, Ohio, a Republic subsidiary.

Eddie Speaks on Air Conditioning

LANSING, MICH.—J. P. Eddie, sales manager of the Dail Steel Products Company, addressed the Y's Men's Club of Lansing recently on the subject of air conditioning.

Mr. Eddie defined air conditioning as follows: "Air Conditioning is the proper tempering, heating or cooling, proper humidifying and cleansing of air together with its movement at proper velocities to effect the desired comfort without unnecessary noise or unhealthful draft, all of these having enough flexibility of control to satisfy the requirements and needs of the users."

According to the speaker, the average individual breathes approximately 30,000 times per day and his daily requirements of air are from 30 lb. to 40 lb., and from this air he derives between 56% and 65% of his energy. This Mr. Eddie uses as an argument for the correct conditioning of air, particularly in cities. In his opinion, the most important thing in air conditioning is to obtain the proper circulation.

Sears to Sell Stokers

CHICAGO—Sears, Roebuck & Company has taken on the sale of domestic stokers. Two sizes with capacities of 50 lb. and 75 lb. will be sold and installed by the mail order house. The unit is manufactured by the Muncie Gear Works, Inc., Muncie, Ind.

Marsh Acquires Tritrol

CHICAGO—Jas. P. Marsh Corporation, manufacturer of heating equipment and industrial instruments, has acquired the business of the Berwyn Regulator Co., Berwyn, Ill., manufacturer of the Tritrol heat regulator.

Production of the Tritrol line of regulators has been transferred to the Marsh plant at 2073 Southport Ave., Chicago, and the sale of the product will be handled through the regular Marsh sales organization, along with Marsh heating specialties and steam specialties.

Henry T. Kucera, inventor of the Tritrol Regulator, has been retained by Jas. P. Marsh Corporation in an engineering capacity.

Jersey Contracting Up

NEWARK, N. J.—Harry Geiser, secretary of the Heating and Piping Contractors New Jersey Association, states that inquiries and estimates figured for June by heating contractors exceed those of May by more than 50%.

"While business is still below normal," Mr. Geiser said, "it is encouraging to note a sudden increase in interest in heating and ventilating and gives rise to the belief that our business will soon show a gain."

Some of this increased work, according to Mr. Geiser, is state and public work, propositions financed by the PWA. There also has been, he said, a noticeably growing demand for reconditioning and replacement work in individual manufacturing plants, which, although not large jobs, are encouraging.

Most of the new business, he says, is on piping replacement, remodeling, and changing of heating systems, to get them in condition, and process piping work.

Reynolds Metals Expands

NEWARK—The glass bulb works of the General Electric Company at Harrison, N. J., have been purchased by Reynolds Metals Company. Reynolds also bought 2.6 acres of land across the street from the eight factory buildings, which gives it a total of 4.85 acres opposite the Erie Railroad station in Harrison.

The parcel includes buildings of two- and three-story construction. In the main building extensive alterations are to be made.

Reynolds Metals operates plants at Louisville, Richmond, Chicago, Glendale, L. I., San Francisco, Knoxville, Tenn., and Youngwood, Pa. The Knoxville plant is that of a subsidiary, the Fulton Sylphon Company, and the Youngwood plant that of the Robertshaw Thermostat Company.

GETTING DOWN TO BASIC FIGURES

Seventy-three heating and air conditioning dealers, some of whom are shown hard at work figuring the requirements for an air conditioning installation, attended the year's second heating and air conditioning clinic of the Rudy Furnace Co., in Dowagiac, Mich., June 4-5.

Campbell Machine Co. Expands

MINNEAPOLIS — The Campbell Machine Company, which has grown in the last 14 years from a small local firm to a nationally-known manufacturer of oil burners, has added 7,000 sq. ft. of floor space to its factory at 2845-51 Harriet Avenue through the erection of a new building. This marks the company's third expansion.

Fillmore with Bilt-Rite

CLEVELAND—Charles H. Fillmore, Jr., has joined Bilt-Rite Homes & Financing Co., the Arcade.

He will have charge of sales of an automatic stoker Bilt-Rite has taken on.

Mr. Fillmore formerly was with the American Radiator Company and a member of the local committee of Home Owners Institute.

United Fuel Adds Frigidaire Line

DENVER—The United Fuel and Equipment Company, successor last year to the retail department of the Colorado Fuel and Iron Company, has added Frigidaire air conditioning equipment to its line, which already includes solid fuel and Iron Fireman automatic stokers. The company features self-contained air conditioning units on its display floor.

United is the first firm in Denver to take on this equipment. Formerly it was handled exclusively by the district Frigidaire office here. Under the arrangement, Frigidaire engineers will cooperate with United in working out technical problems on large installations.

Cleveland Holds A. C. Show

CLEVELAND—The first air conditioning show held in this city was opened in the auditorium of the Electrical League, Builders Exchange Building, May 26. The show was under the direction of the Cleveland Air Conditioning Committee.

Members of the Committee in Charge were Lester T. Avery, Avery Engineering Company; D. P. Dinwoodie, Electrical Houskeeping, Inc.; H. H. Kennedy, Frigidaire Corporation; George F. Bertke, Graybar Electric Company; C. G. McKinley, Ilg Electric Ventilating Company; John H. Carter, Servel Sales, Inc.; Walter Klie, Smith & Oby Company; F. G. Hickling, Westinghouse Electric & Manufacturing Company, and Hatten S. Yoder, York Ice Machinery Corporation.

Included in the exhibits were several room and comfort cooling units shown by York; a store weather maker by Carrier; several unit coolers by Ilg; an air conditioning unit by Servel; the Humeo humidifier by Puffer Hubbard Mfg. Company; the Apex filter and humidifier; a condensing unit by Carbondale Machine Company; filters by Owens-Illinois; room cooling units by Kelvinator, Frigidaire and Westinghouse, and an air conditioning unit by General Electric.

Armstrong Branch Moves

ST. LOUIS — A showroom and office at 1231 Washington Avenue has been leased by Armstrong Cork and Insulation Co., Floor Division. They plan to move from their present location in the Ambassador Building about July 1. Merchandise will be carried in the company's warehouse at 204 South Third Street.

Air Conditioning Engineers Hold Convention and Show

CHICAGO—Approximately 7000 attended the convention and show of the Air Conditioning Engineers held in Chicago, June 4-16. Representatives came from as far west as Portland, Ore., and as far east as Watertown, N. Y. Sessions were held jointly with other engineering organizations.

At the opening lecture Dr. E. V. Hill gave a cabinet demonstration of the "Black Hole of Calcutta" illustrating the "Physiological Effects of Air Conditioning," with members of the furnace industry attending. On June 6, before the International Union of Operating Engineers, he gave a demonstration of "Skin Temperature and Human Comfort," while on June 7 C. A. Rickner spoke on "The Possibilities of Air Conditioning."

Speaking before the National Association of Power Engineers on June 8, W. L. Brown talked on "Application of Copper Tube and Fittings," while there was a cabinet demonstration on "Air and Comfort." On June 12 Doctor Hill repeated his cabinet demonstration and William Goodman spoke on "Design and Operation of Unit Air Conditioning Devices." This was followed by a meeting of the Air Conditioning Engineers convention.

"Air Conditioning and Refrigeration" was the subject of a talk by C. L. Eichstaedt on June 13 at a meeting before the American Society of Refrigerating Engineers and the National Association of Practical Refrigerating Engineers. At the same session W. E. Lowell spoke on "Industrial Air Conditioning."

On June 14 a joint meeting was held of the Chicago Master Steam Fitters Association and the Chicago Chapter of the A.S.H.V.E. At this meeting S. Konzo of the University of Illinois spoke on "Domestic Air Conditioning." At this session the Air Conditioning Engineers held its election of officers.

Those elected for the coming year are:

President, Herbert E. Ziel, Albert Kahn, Inc., Detroit; vice-president, A. E. Christaphensen, chief engineer, Franklin School, Chicago; secretary-treasurer, H. G. Kreissl, American Radiator Co., Vento Div., Chicago; directors, C. L. Eichstaedt, sales manager, Reliance Refrigerating Machine Co., Chicago; R. M. Coe, engineer, Pullman Co., Chicago.

Hydro-Ash Moves

CHICAGO—Hydro-Ash Corporation, which recently secured the manufacturing and sales rights in the United States for the Leach powdered coal burner, has moved to new quarters at 53 West Jackson Boulevard.

Willard Honored

WASHINGTON—In observance of the 50th anniversary of the founding of the School of Engineering, The George Washington University, honorary degrees were conferred upon two members of the engineering profession who have attained eminence as engineers and as university administrators, at the 113th commencement, June 6.

Arthur Cutts Willard, president of the University of Illinois, and Dr. John Lloyd Newcomb, president of the University of Virginia, received the degree of Doctor of Laws.

Doctor Willard is a former member of the engineering faculty of The George Washington University. He has been at the University of Illinois since 1913 as a member of the faculty and head of the Department of Mechanical Engineering. He was elected seventh president of the University of Illinois in March. He is a recognized international authority on heating and ventilation.

Furnace Code Authority to Handle Complaints

WASHINGTON—Acting Division Administrator Barton W. Murray, it was announced June 18, has approved an order authorizing the code authority for the warm-air furnace manufacturing industry to handle trade practice complaints arising under the approved code. It is specified in the order that complaints made by one member of the industry against another member for failure to comply with the code's labor provisions shall be classed as trade practice complaints.

L-K Incorporates

BOSTON—Lord-Kendall Laboratories, Inc., has been formed, with 200 shares of no-par stock, to manufacture and install the Lord-Kendall system of air conditioning. Incorporators are Samuel L. Lord, Dedham, Mass., George H. and M. C. Kendall, Weston, Mass.

Metropolitan Steam Supply Co., Cambridge, capital $50,000, has been incorporated to supply steam to Cambridge buildings. Wesley E. Brown and Harry G. Dodge, Melrose, Mass., and Clement Claflen, Providence, R. I., are the incorporators.

Perkins Joins Central Station Steam

DETROIT—Central Station Steam Co., 2910 East Woodbridge Street, has appointed R. C. Perkins as a member of its field force with headquarters at Minneapolis. He assumed his new connection June 1.

A.C. for Hartford Commercial Buildings

HARTFORD, CONN.—Increased interest in air conditioning facilities is reported in the Connecticut Valley territory, but contracts for installations are hanging fire in many instances. The Automatic Refrigerating Company is installing equipment to air condition the first three floors of the Hartford Electric Light Company's large office building. Other installations here include the first floor and basement of the G. Fox & Company, Inc., department store and the new building of Scott Furriers, Inc.

Tap Room Cooled

KANSAS CITY—The Kornbrodt Kornice Kompany has installed an Auditorium cooling system in the new tap room of the Hotel Muehlebach. Alonzo H. Gentry, of Voskamp & Neville, was the architect. The engineer was W. L. Cassell, and the S. Patti Construction Company was the general contractor.

Revere Appointment

ROME, N. Y.—Revere Copper and Brass Inc., Rome Radiation Company Division, announces the appointment of Nordbeck-Hoyt & Jackson, Inc., 1352 Beacon St., Brookline, Mass., as representatives for the sale of the company's convectors in the eastern portion of Massachusetts.

Opens Display Room

BEVERLY, MASS.—As part of General Electric's campaign to establish a series of branches and franchise dealerships for its air conditioning equipment, Samuel Knight & Sons have opened a showroom here and one in Gloucester, Mass., to carry and exhibit a full line of G-E air conditioning equipment, in addition to G-E oil furnaces. This concern is now installing three complete air conditioning equipments in homes now under construction. Roland Knight is general manager of the Beverly branch.

The English Freeze and—

Many of Oxford's beautiful buildings are not so medieval as they look, in spite of the fact that some of the colleges were founded back in the thirteenth and fourteenth and fifteenth centuries. The heating arrangements in general use, however, are fully as medieval as the buildings are supposed to be.

If a room has any heating arrangement at all—and many undergraduates shiver miserably in rooms that have none—it is a fireplace about the size of half a Gladstone bag. Within this diminutive aperture a few fragments of cannel coal are coaxed into a tarry-smelling glow that can be felt for a distance of three or four feet.

The Bodleian Library at Oxford is not only one of the most justly celebrated libraries in the world but also one of the coldest. Certainly, so far as I am concerned, it is the coldest, and the next coldest is that housed in the Radcliffe Camera, just across the street from the Bodleian. A brace of partridges, hung in either the Bodleian or the Radcliffe Camera during early October, would keep until April. One who visits the Bodleian during the winter will find the students huddled in overcoats, their feet wrapped in rugs, their breaths rising in little clouds of fog, their faces pinched and their noses a pale blue from the cold, their fingers almost too numb to clutch a pencil.—*Kenneth J. Roberts in "An American Looks at Oxford"; Saturday Evening Post.*

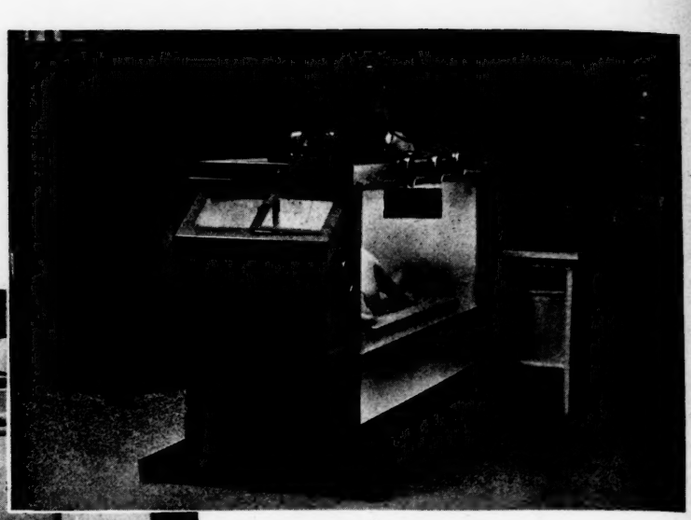
Americans Roast

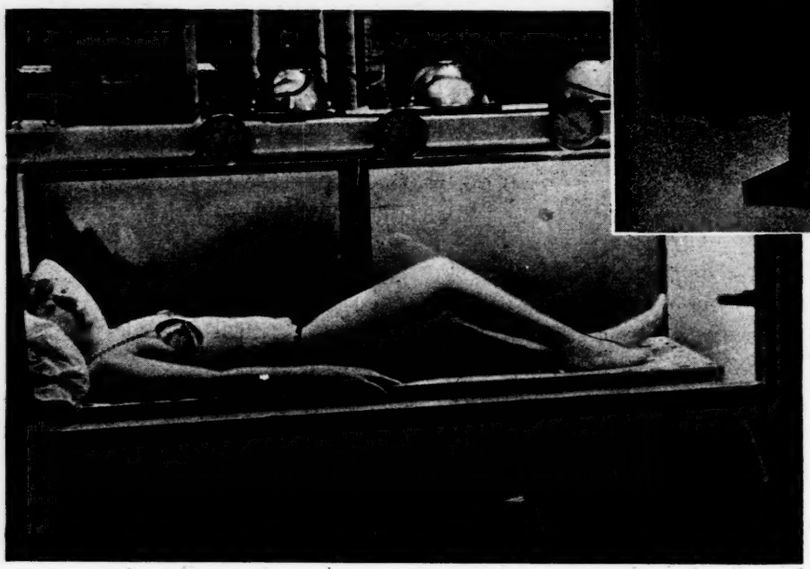
The new Undersecretary of Agriculture, for whom by the way that post was created, first saw the light of day on a farm in Sinclairville, N. Y. Though part of the dairy district, this was a fruit farm primarily. Doctor Tugwell worked on it with both hands right in the dirt and once while running the dairy side he raised a prize calf. What's more, in college he specialized in milk; the study of it. He said in reply to questions that he knew how hard it was to wring a dollar from the soil and he'd had farm mud on his boots.

One diversion the people in the far corner had, the far corner over behind the Committee table. It was a diversion not connected with agriculture. Seems the hearing room had an air-cooling system, not that it appeared to do the slightest good to the air. Scarcely anyone knew that a cool breeze was being pumped up through holes in the floor—too many people were standing on the holes.

But a hot day means thin dresses. Every once in a while an unwary feminine spectator would edge into the air-cooling corner where the wind came up in gusts and the knotty problems of the farmer would by any number of male spectators be completely forgotten.—*Report of Senate meeting on Rexford Tugwell's confirmation as Undersecretary of Agriculture; The United States News, June 18.*

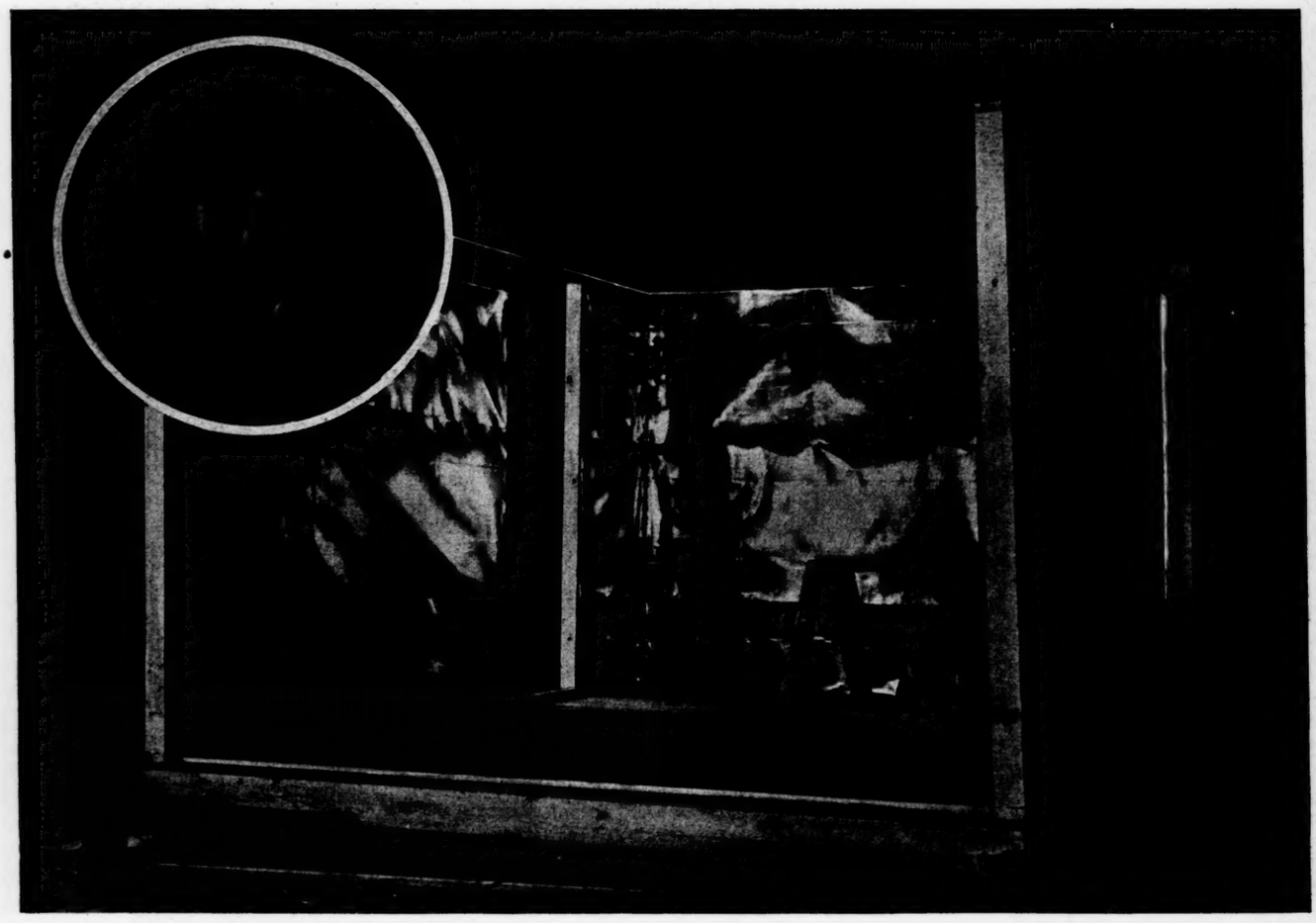
PICTURE PARAGRAPHS



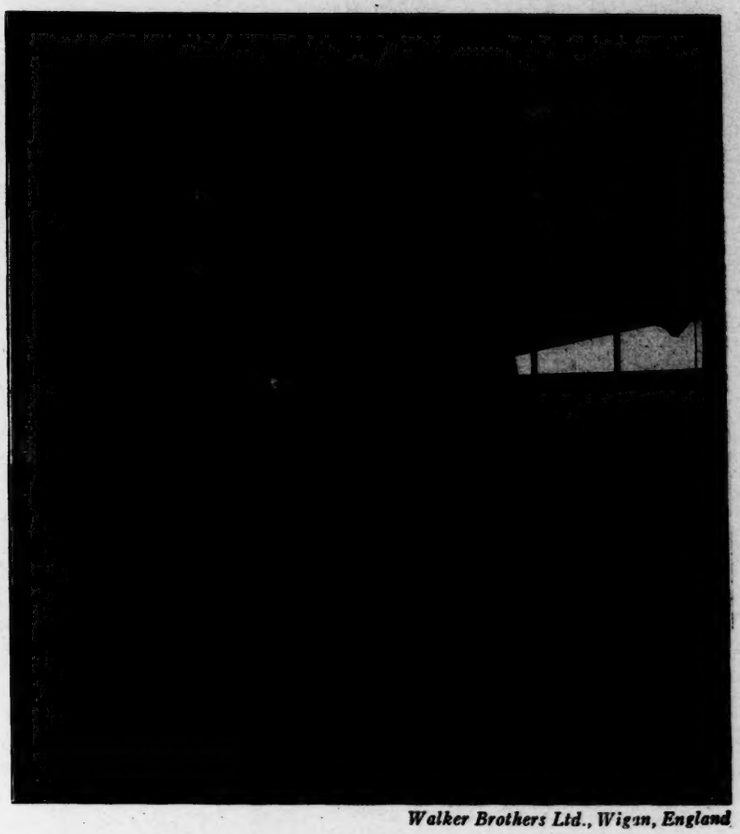


WHAT THEY SAW. Several hundred members of the Air Conditioning Engineers at their annual convention in Chicago witnessed a demonstration of this "psychological" cabinet under the direction of Dr. E. V. Hill. The inside of the cabinet was kept at 60° but the occupant was comfortable, her skin temperature being kept at 93° by radiant heat from infra-red and other lights above. Indicating thermometers and hygrometers showed conditions inside.

100° BELOW ZERO. 9000 miles to the south, Admiral Richard E. Byrd is spending the winter months in this hut, shown while under construction. His daily fuel allotment for both heating and cooking is less than 4 qt. of oil. The walls are 4 in. thick and consist of white pine, Tek-Wood, and layers of thin aluminum foil, the last supplied by Reynolds Metals Company. The foil reflects 95% of the radiated heat rays. Insert shows Victor H. Czegka (pronounced checker), gunner, U. S. Marine Corps, who designed the building.



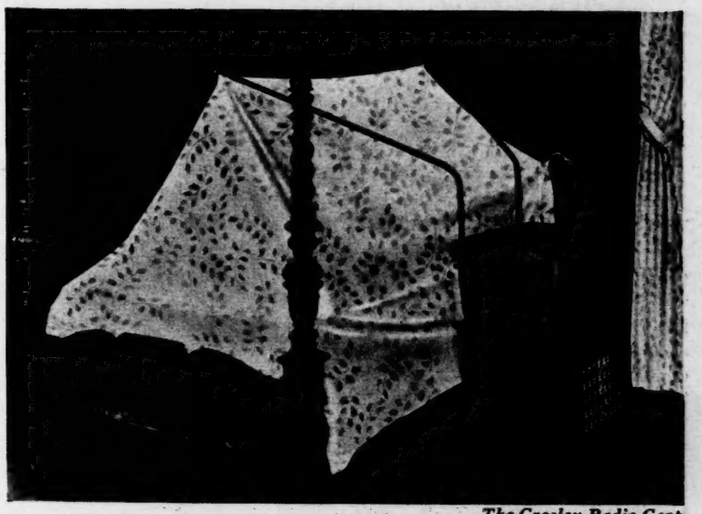
↑ SUGAR DADDY. A plant physiologist of the Department of Agriculture examining sugar beets grown in a remarkably short time in a climate machine which regulates humidity, temperature, air velocity, light and soil moisture.



Walker Brothers Ltd., Wigan, England

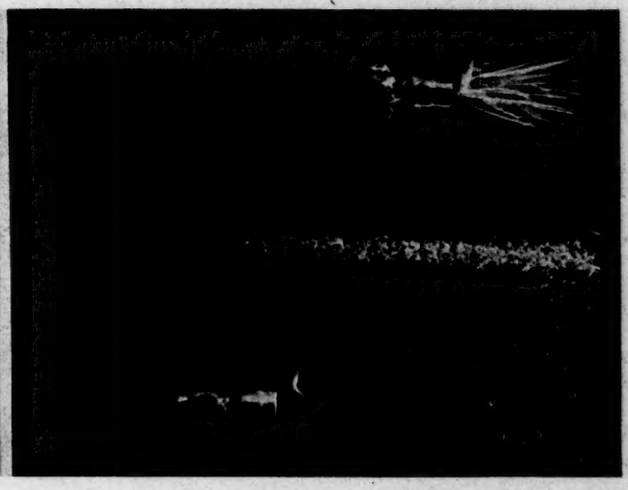
28 FT. IN DIAMETER, this 62 r.p.m. impeller is part of the ventilating system of the Mersey Road Tunnel at Liverpool, England. The tunnel, which will be opened July 17 by King George, cost over 6 million pounds. The bearings are fitted with thermostats which stop the motor in case of overheating.

AIR CONDITIONED BED. A mechanical → cooling unit with ¼-hp. motor and canopy brings comfortable sleep on hot, muggy nights. First cost, $150. Operating cost, low, since canopy reduces heat gain from room.



The Crosley Radio Corp.

DID YOU EVER SEE AN ION WALKING? An ion-counting machine used in the Department of Terrestrial Magnetism of Carnegie Institution of Washington. View to the right shows groups of small ions loaded with water droplets. Those in the top section are formed by shattering of air molecules by alpha radium rays. Those in the center are created by X-rays. Those in the lower section are due to beta rays from radium.



115 Jobbers attended the Fox Furnace Company school June 5-7

Fox Conducts School for Jobbers

CHICAGO — During the three days of June 5-7, The Fox Furnace Company, division of American Radiator & Standard Sanitary Corporation, conducted what is believed to be the first air conditioning engineering school for heating supply jobbers. Classes were held in the ball room of the St. Clair Hotel here. Registration totalled approximately 115, which included a small number of heating contractors.

At this school, there was introduced the new Sunbeam engineering manual which simplifies heat loss calculations for any type of building construction and any ordinary temperature difference. Those in attendance calculated the heating requirements; computed the necessary duct, riser and register sizes, and located the air conditioner, ducts, risers and registers. In other words, every "student" designed an air conditioning installation for a residence from the building plans.

The school was formally opened and closed by C. A. Olsen, president of The Fox Furnace Company. J. E. Maynard, chief heating engineer, presided over the instructional work.

In his opening address, C. A. Olsen announced the appointment of George Boeddener as general sales manager of The Fox Furnace Company, succeeding Leon A. Selman, who died last month. Mr. Boeddener has served The Fox Furnace Company in various sales capacities for the past several years and is personally acquainted with the heating trade in many sections of the country.

Announcement was also made of the appointment of C. L. Travers as assistant sales manager.

Power Show Set for Dec.

NEW YORK—The 11th National Exposition of Power and Mechanical Engineering will be held this year, December 3-8. The last Exposition was held in 1932. Grand Central Palace, New York, will again be the location. The Exposition will adhere to its usual policy and will take place during the same week that the American Society of Mechanical Engineers holds its annual meeting.

New Boston Frigidaire Distributor

BOSTON—General Heat & Appliance Company has been appointed Greater Boston distributor of Frigidaire complete air conditioning, taking over the distribution from the Boston branch of Frigidaire Sales Corporation, together with the division's staff of air conditioning engineers.

Illinois Holds Short Course on Coal

URBANA, ILL.—Pres. A. C. Willard of the University of Illinois will make the opening address at the Coal Utilization Short Course here July 12. The course, sponsored by the College of Engineering of the University, will be held July 12-14.

Its purpose is to make available to the visitors the latest information of interest to coal operators, combustion engineers, salesmen, purchasing agents, and retail coal merchants. The course covers the entire field of the utilization of coal, with special emphasis placed on the preparation and combustion of this fuel and the use of combustion equipment.

Standard Oil Adopts New Policies

NEW YORK—New policies involving the marketing of products of subsidiaries of the Standard Oil Company of New Jersey have recently gone into effect. Among these are the introduction of an improved domestic fuel oil, Esso-heat, and an expansion of the oil burner marketing program. Improvements in the fuel oil represent three years of research in an oil burner laboratory at the Bayway refinery.

The oil burner program was extended by making Gilbert & Barker burners available through the petroleum marketing organization in Virginia, North Carolina, and New Jersey. The success of this program had been assured by experiments in Washington and Baltimore.

French Tunnel Ventilated

PARIS—The subterranean vehicular passage, 250 meters in length, which passes under l'avenue Foch at the entrance to the Bois de Boulogne, is mechanically ventilated to avoid accumulation of gas escaping from the automobiles. This ventilating installation, by Etablissements Emile Prat-Daniel of Paris, includes two ventilators with a capacity of 90,000 cubic meters per hour. The vitiated air is forced out through diffusers, whose orifices are hidden in the center of grass plots.

May of Canada Moves

TORONTO—May Oil Burner of Canada, Ltd., has combined its factory and retail division and moved to 17 Elm Street.

Bridgeport Holds Show

BRIDGEPORT, CONN. — Manufacturers and dealers in heating equipment exhibited a wide variety of units and appliances at the Bridgeport Prosperity Exposition, held at the former plant of the Locomobile Company here in May.

Exhibitors included: Motor-Stokor Sales & Service Company; Apex Tool Company; Whitney Automatic Stoker; L. C. Kelly Sales Company; General Electric oil furnace and air conditioning equipment; Oscar B. Bertilson Company, Oil-O-Matic oil burner; Blue Ribbon Garage, Inc., Oil Heating Division, Quiet May oil burner; Connecticut Oil Burner Co., water heaters; Wellington-Kincaid Company, Capitol oil-burning boiler; Bridgeport Brass Company, piping, bellows, and parts used in radiators, temperature control equipment, etc.; Jenkins Bros. Company, valves.

New S.M. for Combustion

NEW YORK—Appointment of H. S. Colby as general sales manager of Combustion Engineering Company has been announced by R. M. Gates, vice-president of that company.

For the past 20 years Mr. Colby has been engaged in design, production, and sales of steam generating equipment involving boilers, stokers, pulverizers, economizers, and air preheaters. Until recently he was president of the Air Preheater Corporation.

A.C. for Southern Store

NEW ORLEANS—The American Heating and Plumbing Company, Inc., reports the installation of an Auditorium air conditioning system in the department store of J. Rubenstein & Company, Inc., Canal St., New Orleans. The engineers for the installation were Leo S. Weil and Walter B. Moses.

Seabury Adds Connecticut

BOSTON—R. Seabury, Boston representative of Jas. P. Marsh Corporation, will handle that company's line of industrial instruments, gauges, automatic air valves and similar staples to the jobbing trade of the entire state of Connecticut with the exception of Fairfield County, effective June 1.

Fairfield County will continue to be handled by the company's New York office located at 551 Fifth Avenue.

Starts A.C. Column

BOSTON—A department devoted to air conditioning has been added to the columns of the *Banker & Tradesman*, Boston. F. N. Layton is the editor.

Tunnels Make A.C. Desirable

DENVER—Seven lounge-observation cars and five dining cars, placed in service by the Denver & Rio Grande Railroad over the new route through the Rocky Mountains, are equipped with air filtering and cooling equipment. The route was opened June 16 at ceremonies marking completion of the Dotsero Cutoff, the final link.

Presence of more than 40 tunnels, one of them the six-mile Moffat Tunnel, on the route through Colorado makes air conditioning especially desirable.

The cooling system of each car consists of a large tank which contains 3,600 lb. of ice, a series of pipes through which ice-water is circulated, and a power-driven fan which draws the air in through a filter, blows it over the cold pipes, and distributes it evenly throughout the car. Power for fan and pump is furnished by an electric motor. The system is capable of reducing the car temperature 20° in half an hour.

A.C. Course at Lewis Institute

CHICAGO — The Lewis Institute is offering a summer course in air conditioning, which started June 25 and will continue for 10 weeks. The course is intended for those who have had proper preliminary training and who wish a short course in the subject.

Burner Distributor Increases Territory

EAST ORANGE, N. J.—The General Appliance Corp., East Orange, has been assigned the distributorship for Delco heating appliances for the lower portion of New York State, including Manhattan, Bronx, and part of Connecticut, in addition to its present territory of northern New Jersey.

In a little over a year the corporation has grown from a sales organization embracing only Essex County to one covering the largest territory in the heating industry, it was stated. The concern succeeded the Essex Utilities Company in the late spring of 1933. Charles D. Drew, vice-president and general manager, is active head of the company affairs.

Coal Burner Standards Approved

WASHINGTON—The Department of Commerce, Bureau of Standards, announced June 22 that the Commercial Standards for Domestic Burners for Pennsylvania Anthracite (Underfeed Type) have been approved by a number of manufacturers and users, and are considered for new production as of August 1. The announcement was made by F. W. Reynolds of the Division of Trade Standards.

A. S. H. V. E. Holds Summer Meeting in the Poconos

(Concluded from page 38)

of the study made in the Grant Building, Pittsburgh, during the past heating season. As such it should be considered as a single step in the analysis of a much more comprehensive study. The results suggest reasons for shortcomings in the present methods of estimating heating requirements of buildings based upon improper application of local weather bureau records to conditions in the immediate environment of a building.

The data obtained from the tests showed that the "heat flow through a window from a 70° room calculated from the observed temperatures and wind velocities outside of the window is considerably lower than that calculated from the weather bureau data. When the rate of heat flow is calculated from the observed relation between the inside air temperature in the center of the room and the glass surface temperature and the accepted inside film conductance coefficient, the discrepancy between this value and that calculated from the weather bureau is increased. The average for all tests shows the heat flow calculated from the observed temperatures and wind velocities outside of the window to be 83.6% and the heat flow calculated from the inside film conductance coefficient to be 75.4% of that based upon weather bureau observations. While these facts cannot be accepted as final proof of error in the practice of basing heat loss calculations directly on weather bureau data, they do represent strong evidence of such an error.

"The investigation showed considerable variations in the magnitude and the direction of the wind velocity observed 3 ft. outside of the window. It was also shown that these velocities were lower than those usually shown by the weather bureau. This reduction in observed wind velocity must necessarily be an important factor in reducing the actual heat loss below that estimated from weather bureau data."

In this connection it should be pointed out that the velocity a few inches away from the glass or that actually affecting the surface heat transfer may be even a lower percentage of the weather bureau values, because windows are set in several inches from the plane of the outside of the building wall.

"What is the Cooling Load Factor in Air Conditioning?" was discussed by

John Everetts, Jr. The elements involved in making up the cooling load factor, the speaker said, are made up as follows:

Heat transmission through building; sun effect; internal light and power load; people load, and outside air load.

The speaker contended that since the cooling factor is made up of so many variables it is impractical to use any one load factor as a criterion for other similar installations unless the items making up the load are approximately the same in proportion.

He also stated that "the load factor will be different for similar installations located in different parts of the country because of the difference in the design conditions."

In his opinion "the cooling load factor is only to be used to determine the operating cost of the refrigerating end of the system and does not in any way affect the operating cost of other equipment, such as pumps and fans which are generally operated at full load throughout the season."

"The Water Vapor Centrifugal Compressor" was described by Paul Bancel, Ingersoll-Rand Company. The author explained the characteristics of this machine which uses water as the refrigerant. He explained that the idea is not new, but that the difficulty was in developing a device to carry out the principle.

D. W. McLenegan and M. N. Halberg, both of General Electric Company, were the authors of "Application of Air Conditioning Equipment on Residential and Commercial Power Circuits." Mr. McLenegan presented the paper. According to the authors "the use of motor-driven compressors for air conditioning on residential and commercial power lines introduces two electrical problems:

"1—Voltage drop due to the starting current of the motor.

"2—Continuous voltage fluctuations due to the current variation caused by the compressor strokes.

"Throughout the residential sections of many cities, three-phase power is not readily available and air conditional load is commonly served from the same single-phase low voltage or 'secondary' circuit which carries the lighting load. Any voltage variations great enough to affect the steadiness of domestic lighting may cause serious complaint.

"These problems and the methods of analyzing them in individual cases are well known in industrial work, but where large numbers of installations are to be made, and where both time and engineering facilities for complete mathematical investigations may be lacking, some form of 'mass solution' to these problems is needed, if the application and installation of air conditioning equipment is to proceed rapidly and without frequent set-backs."

They proposed the following method "to offer a suitable means of determining in advance whether a light flicker is going to occur, so that suitable steps may be taken to avoid this occurrence.

"1—A suitable standard should be recognized as to the voltage variation which may be allowed without causing a flicker.

"2—The power company can specify a typical line, giving the ohms, resistance, and reactance of the secondary circuit involved, including the transformer. These values may be general values which fairly represent the distribution lines found in residential districts, or in some cases it may be necessary to specify values which apply to individual installations.

"3—It is possible for a manufacturer to calculate quite readily whether a given machine, applied on the specified circuit, will produce a voltage variation greater or less than the allowable limit."

The authors presented a curve showing a standard which has been well tried out in practice, and concluded as follows:

"1—Light flicker is most likely to occur with low-speed machines having one or two cylinders. Such applications justify careful calculation in advance of the installation.

"2—Four-cylinder machines are unlikely to produce light flicker. In general, if the circuit is large enough to start such a machine without excessive voltage drop, there is little danger of trouble due to light flicker.

"3—Where an installation does produce a continuous light flicker, one remedy is to replace the compressor driving motor with one having a higher percentage of slip. If, for example, the full-load slip is increased from 3% to 6%, the variations in current and in power factor are reduced by about one-half.

"This remedy is open to two objections—that the speed, output, and efficiency of the unit are reduced in proportion to the speed (say 3%), and that the maximum output of a single-phase motor is seriously reduced if the slip is increased much beyond the values given above.

"4—Current pulsation can be reduced by increasing the flywheel effect of the compressor belt wheel. However, the possibility of causing a lighting disturbance at starting must be kept in mind when adding flywheel effect, since the acceleration will be slower and the voltage drop prolonged.

"5—In calculating the voltage variation either at starting or due to the compressor strokes for a *domestic* installation, the house wiring may generally be neglected, since motors of 1 hp. or more are usually on a separate meter, with separate wiring which may as well be installed with ample cur-

JAS. P. MARSH CORP. EMPLOYES GOLF ASSOCIATION

Members of the association at the first tournament of the year, held at White Pines Country Club, Chicago, June 2.

rent-carrying capacity. However, in large buildings, the voltage drop within the building becomes the real problem. Power is supplied to many such buildings through high-voltage, large-capacity feeders, and all of the low-voltage distribution is within the building itself.

"6—The application of the equipment affects the seriousness of the flicker problem. Where the equipment is used almost entirely during the day, as in an office where artificial lighting is only a partial source of illumination, a flicker will be less noticeable than in an auditorium used for evening lectures, etc.

"7—The application of cooling equipment in residential and small commercial districts will undoubtedly bring up these problems on every power system and with every manufacturer of such equipment. If uniform methods of handling these questions can be adopted, the problem for both the manufacturer and the electric utilities will be simplified."

Thomas S. Holden, vice-president, F. W. Dodge Corporation, member of numerous committees of various bodies studying such subjects as slum clearance, building modernizing, and similar projects, addressed the joint session on "The Reemployment of the Construction Industry." The speaker stated that the establishing of PWA and TVA and the passing of the National Housing Act, and similar moves made by the Administration are in the right direction, and that the placing of mortgages on a sound basis will enable the construction industry to operate at a higher rate of capacity than would be possible if we continued along the old lines of speculation which caused the collapse in 1929.

At the dinner held Wednesday evening, Prof. A. C. Willard, who assumed the presidency of the University of Illinois, July 1, made the principal address. Professor Willard's message was that in his new position he will work toward furthering the interests of the engineer, and do his part in assisting in putting the engineer on a more professional basis.

A description of the engineering calculations involved in the selection of refrigeration equipment and a comparison of test results with a theoretical analysis of the heat load were described in a paper entitled "Operating Results of an Air Conditioning System Compared with Design Figures," by John R. Hertzler. The building system which the author discussed is that in the Union Dime Savings Bank, Brooklyn, N. Y.

According to the author "air conditioning systems are seldom called upon to operate under design conditions but it so happened that July 1, 1932, at the beginning of a quarter, a busy banking day, provided maximum outside temperature and humidity conditions." In his paper the author summarized these data and showed how closely the actually obtained conditions followed the design conditions. Further, the author points out that the power and water costs were predicted within an accuracy of 5%.

Interesting points concerning the installation were that due to the high ceiling in the bank it was found that approximately 15 ton of refrigerant could be saved in the installation by introducing the air supply for summer cooling within 10 ft. of the floor line. Since this 15 ton was almost 15% of the previously calculated load, the introduction of air at this point resulted in a considerable saving.

The "Insulating Value of Bright Metallic Surfaces" has been investigated in a research project at the University of Minnesota in cooperation with the Society's Research Laboratory, and a report on this work was presented by F. B. Rowley, director of the Experimental Engineering Laboratories, University of Minnesota. The purpose of the work was to show the effect of bright metallic surfaces on the heat transmission coefficients and point out some of the difficulties in making a theoretical analysis or in establishing absolute coefficients by test procedure which can be indiscriminately applied to all cases. According to Professor Rowley "the values which have been accepted for surface conductances from building materials may be reduced when using surface finishes which have a high resistance to radiant heat. The reduction will depend upon the emissivity of the surface and upon the mean temperature between the surface and the surrounding objects. It will be independent of air velocity over the surface. For average conditions of aluminum surfaces which are highly polished, it would seem reasonable to make reductions in the transmission coefficients as shown in the following table for the different mean temperatures. These reductions, however, cannot be blindly followed, due to the many variables which enter the problem."

REDUCTION IN AVERAGE SURFACE TRANSMISSION COEFFICIENTS CAUSED BY COVERING THE SURFACE WITH BRIGHT ALUMINUM FOIL

Mean Temperature, °F.	Reduction in Coefficient, B.t.u.
20	0.559
40	0 634
60	0.711
80	0.797
100	0.887
120	0.99
140	1.09

"The generally accepted coefficients for wall surfaces and for air spaces which involve surfaces should be revised if special materials with low emissivity coefficients are to be used for surface linings. The reduction will depend upon the surface characteristics of the material. If the emissivity coefficient is known, the correction can be made with reasonable accuracy by calculation."

"Heat Transfer from Direct and Extended Surfaces with Forced Air Circulation" was the title of a paper based on research conducted at the Case School of Applied Science in cooperatin with the Society's Research Laboratory. The report was presented by G. L. Tuve and C. A. McKeeman, both of the staff of Case. The authors outlined the variables of importance in designing or calculating to determine the heat transfer, discussed the previous work done on the subject, and the correlation of the present work with previous investigations, and presented data on the results of their investigation on some of the variables. According to the authors "it is evident that while convenient methods of calculation are available after the constants for a particular design have been established by experiment, yet much remains to be learned about the effect of such primary variables as tube and fin diameters, fin thickness and fin spacing. We know a little about the practical effect of air-flow conditions, but we lack any method of adequately measuring these conditions in a given installation and the theory or principles underlying these effects have not been clarified. We may state that the heat transfer coefficient varies directly with some power of the velocity, but whether this variation is as the square root or as the 0.8 power, or some value between, we can only predict after further work has been done on the effect of the primary design proportions."

A continuing report on a study of the performance of convectors being carried on at the Engineering Experiment Station at the University of Illinois—a joint project of the University and the A.S.H.V.E.—was presented by A. P. Kratz, M. K. Fahnestock, and E. L. Broderick, all of the staff of the University of Illinois, entitled "Factors Affecting the Heat Output of Convectors." Among other things, the authors found that it would probably be more accurate to use the exponent 1.5 rather than the presently used figure of 1.3 in the general equation for reducing the heat output of a convector in the testing conditions to the output under standard conditions. The exponent of 1.3 is now recommended in the standard code for testing and rating concealed gravity-type radiators.

Among the papers on the American Society of Refrigerating Engineers' program at that society's meeting at Skytop were those of Everett Ryan, chairman of the Boston section, A.S.R.E., on "Marketing of Commercial Air Conditioning," and Peter Kalustian on "Analysis of the Ejector Cycle." The latter was a study of the thermodynamic cycle of the steam jet refrigeration system.

Furnace Men Meet in Chicago for Mid-Year Convention of N. W. A. H. & A. C. A.

CHICAGO—The mid-year convention of the National Warm Air Heating and Air Conditioning Association was he'd here June 12-14 in the Stevens Hotel. President H. T. Richardson, F. G. Sedgwick, and W. L. Rybolt presided at the sessions.

Manufacturer and dealer meetings were held on June 12, while at the morning session on June 13 President H. T. Richardson gave the president's address. Mr. Richardson outlined the improvement in the industry during the past year and spoke of the outlook for the future in the light of the Code which has eliminated many former abuses. In his opinion the furnace industry is now strongly established and a closer relationship of all groups is rapidly being established.

I. W. Rowell and J. F. Firestone spoke on "Cooperation with Heating Contractors." The former covered the subject of manufacturer cooperation with the warm-air heating contractor and he pointed out that if the warm-air furnace industry sold but 1% of their potential market they would have a dollar volume equal to that of the refrigerator industry. Mr. Rowell pointed out that the greatest existing menace to the warm-air and residence air conditioning industry today is the competition of the large corporations who are manufacturing and selling heating and cooling equipment through their own dealer organization, exclusive of the recognized heating trade, and outlined the reasons why these organizations have followed this procedure. The dealers' and contractors' negligence in properly educating and equipping themselves means that this equipment is finding distribution outside of the logical channels.

To offset this development, Mr. Rowell advocates the handling of one line of equipment on the part of the dealer and contractor, and that the manufacturer assist the dealer with all necessary information relative to his product and successful schemes for selling. In some instances, it is advisable for the dealer-contractor to handle allied lines, and it is up to the manufacturer to assist the dealer in this event.

Mr. Firestone discussed the work done at the University of Illinois, and spoke of the benefits derived by the dealer from the work done by the manufacturer on research, and emphasized the need of better installations. He maintained that furnace manufacturers must increase their dealer outlets and through field men educate the dealer in ways of obtaining the largest possible amount of business in the existing home field through modernizing and repairs.

"What's Ahead in Residential Building" was the subject of a talk by Bernard L. Johnson. The speaker referred to the growing interest in air conditioning in the residential market and to the Real Property Inventory being conducted by the government. According to Mr. Johnson there are approximately three million furnaces now installed in the residences of this country.

H. W. Thorne, president of Holland Furnace Company, answered the question "Is Our Business Different?"

At the afternoon meeting, June 13, F. E. Mehrings, Meyer Furnace Company, reported that the furnace manufacturers' code is now working satisfactorily. He pointed out that the Contractor and Accessory Code is not as yet approved, but that approval is expected in the near future. Mr. Mehrings was followed by Beverly S. King, assistant deputy administrator of NRA, who was introduced by Mr. Richardson. Mr. King criticized the Darrow Committee report and said that the complainers were chiefly the chronic type found in all industries.

R. W. Blanchard reported that the code of the register manufacturers is expected to be approved shortly.

A. W. Wrieden, chairman of the Code Authority of the Warm Air Furnace Manufacturing Industry, said that this group's code has been in operation six months. Mr. Wrieden reviewed the tremendous amount of educational work required in interpreting the code to the industry and said that the code budget was working out satisfactorily.

At the June 14 morning session A. C. Willard, president of the University of Illinois, reviewed "Fifteen Years of Research in the Furnace Heating Industry." The speaker then went on to discuss some of the problems which are yet to be solved, among which are the reducing of the temperature difference between floor and ceiling, stratification of air, wall temperatures, and humidification. He pointed out that the warm-air heating industry must educate the public as to the proper type of building construction to obtain satisfactory heating. He advocated the interpretation of research data of the University in the language of the layman. Professor Willard cautioned his hearers on the danger of over-selling warm-air heating.

F. G. Sedgwick, chairman, presented the report of the Research Advisory Committee.

Edwin A. Scott answered the question "Should Our Research Data Be Tabulated in Book Form?" As chairman of the committee which studied this matter Mr. Scott proposed the publication of such a book, with an interpretation at the end of each chapter so that the average contractor or dealer could make better use of the more or less technical data. The book will be published in two volumes, the first dealing with gravity warm-air heating and the second with forced circulation.

A. P. Kratz, research professor at the University of Illinois, spoke before the meeting on "Insulation of Homes." He showed how to compare insulation materials and methods of insulating and said that tests at the research house at Urbana revealed that insulated walls bring a saving of about 15% to 20% in fuel and that with ceilings also insulated savings range from 25% to 35%. Storm windows and doors will save from 20% to 25%.

S. Konzo, special research associate at the University of Illinois, presented a progress report in warm-air heating research. In this report he spoke on "Tests on Thermostat Location." In these tests it was found that with the thermostat at the 30-in. line a more comfortable temperature existed in the living zone but that fuel consumption and thermostatic action increased. The setting of the thermostat had to be at 68° when located at the 30-in. line to maintain the desired comfort. Professor Konzo also spoke on register types, furnace sizes, and air washers.

At the closing session on the afternoon of June 14 D. M. Dobbins spoke on "Why Not Do It Now and How Are We Going To Make A Profit?" while C. C. Whittier spoke on "Heating and Air Conditioning the Modern Home—An Opportunity."

Committee reports were presented as follows: "Credit," by L. B. Murphy; "Public Information," by A. F. Frazee; "Membership," by R. W. Blanchard.

Bryant Buys Silica Gel

CLEVELAND—The Bryant Heater Company, manufacturer of gas heating and air conditioning equipment, has acquired exclusive rights to the use of silica gel and to the equipment designed for the use of this absorbing material for comfort air conditioning.

Silica gel has had a considerable range of applications and has been used in, and largely promoted by, the gas industry so far as air conditioning is concerned. Its use was promoted by a committee of the American Gas Association, which sponsored a number of trial installations. Installations have included those in residences, a large bank, restaurants, and similar applications.

Three Frigidaire officials at the dedication of Frigidaire's air conditioned house at A Century of Progress: H. W. Newell, vice-president in charge of sales; B. B. Geyer, president, the Geyer Company; W. F. Armstrong, vice-president and assistant general manager; E. G. Biechler, president and general manager

Heating Men Elected

TORONTO—Interests of the heating and plumbing trades will be well looked after as far as possible in the purchasing agents' organization. Fred Lucas, Purdy-Mansell, Ltd., has been named vice-president of the National Association of Purchasing Agents and chairman of the Canadian Council. Other members of the heating industry on the executive rolls of the Toronto branch of the association are: C. S. Webber, Page-Hersey Tubes; W. G. Addison, Jas. Morrison Brass Co.; C. G. Sherwin, Grinnell Company of Canada, Ltd.; and A. J. Kinsey, Trane Company of Canada, Ltd.

Brown Talks on Housing Act

NEW YORK — "The National Housing Act will release $1.5 billion for repairing, modernizing, and construction of homes," declared Lewis H. Brown, president of the Johns-Manville Corporation and chairman of the sub-committee of the National Housing Act of the Durable Goods Industries Committee at the luncheon of the New York Building Congress at the Hotel Commodore June 20. The subject of his talk was "National Recovery and the President's National Housing Act."

The purpose of the act is to stimulate small construction and repairs so that unemployment in the durable goods industries may be relieved until the construction industry returns to normal. "Without going into detailed figures, which covered a study of the ratio of normal construction to national income from 1910 to 1930, we determined that if nothing were done we could expect in the five years from 1935 to 1939 not more than about $14 billion of construction—less than $3 billion each year, or about one-third of that in 1928. To sit quietly by and do nothing in the face of such a situation seemed intolerable. Artificially stimulated public works alone do not seem to be an adequate solution to this problem."

Therefore, a special committee was appointed to make an intensive study of the possibilities of increasing employment through uncovering the actual need in all parts of the country for new construction, rehabilitation, and modernization. The conclusions of the committee were embodied in the National Housing Act, submitted to Congress on May 14.

Coal Price Drops

NEWARK, N. J.— A new schedule of prices for coal in North Jersey which on their face show a decrease to the average consumer of 10 cents a ton, has been issued by the State Retail Coal Code Authority. The new prices are effective at once.

N.D.H.A. Holds 25th Convention

(Concluded from page 39)

temperature control equipment.

Sales Development work was given attention through four papers and an address arranged by the committee. This phase of district heating has become of such interest that the speakers were not only followed closely but were questioned extensively during the course of the session. Utility sales methods were discussed by Robin Bell who used the sale of gas appliances by the Rochester utility as an example of how an efficient sales force has been built up and of how effective sales methods have been found. Advertising was the subject of a paper by J. M. Arthur, while Robert D. Martin described methods which have been successfully used in getting new business. Outstanding among the papers dealing with sales development was that of R. J. J. Tennant who outlined methods of meeting competition. He stressed especially the necessity of having available enough information to present a convincing proposal and to attack weak spots in competitive proposals. He advocated also the collection of data whereby the evaporation and evaporating rates of boilers fired by stokers and by oil burners could be predicted. In his judgment several competitive methods such as "pay as you save" plans were commendable and could no doubt be used with good effect. He believed also that good service is of prime importance in meeting competition, and that proved reliability of the service should also be one of the most forceful arguments. The large number of papers on the Wednesday morning program made it necessary to postpone discussion until later in the meeting.

Station Engineering and Steam Distribution were the subjects to receive attention during the session on Thursday morning. Proper procedure in laying up boilers when out of use, development of high temperature cements and plastic coverings, and the use of an operating manual for training station employes were the subjects of three papers on station engineering. Distribution was considered in five papers prepared by the committee having this subject in charge. Expansion joints and their lubrication and insulation, line losses, and data on soil temperature adjacent to a large underground steam line were the topics considered.

At the manufacturers' open round table the Tritrol method of temperature regulation of Jas. P. Marsh Corp., Chicago, was described. This is a method of control based on the outside temperature and operating through electric circuits controlled by the temperature outside.

Following his induction into office President Baldwin spoke of the opportunities which the Association faces.

Social events on the program were notable not only for their extent but also for the smoothness with which they were carried out by the committee under the direction of Landis Shaw Smith, past-president of the Association. A new competition cup donated by the American District Steam Company for the annual handicap golf tournament was played for for the first time and was awarded to Warren Webster, Jr.

Boston Oil and Gas Men Agree

NEW YORK—In the first of a series of conferences with gas companies in key oil burner territories, representatives of the oil burner industry, under the direction of the American Oil Burner Association and the Boston Oil Burner Associates, were successful in obtaining an agreement from the Consolidated Gas Company of Boston which eliminates an alleged unfair competitive situation in the greater Boston territory, according to announcement made by R. M. Sherman, president of the American Oil Burner Association.

At a conference on June 7, it was mutually agreed between both gas and oil burner interests represented that the following terms and conditions of sale would apply on all proposals submitted by the gas company on and after June 15 with respect to the sale of domestic heating equipment:

a. The down payment on all contracts shall not be less than 10% of the contract price.

b. Monthly payments on the unpaid balance of contract shall not extend beyond 24 months.

c. The financing charge of not less than ½ of 1% per month will be made on the unpaid balance of all time-payment contracts.

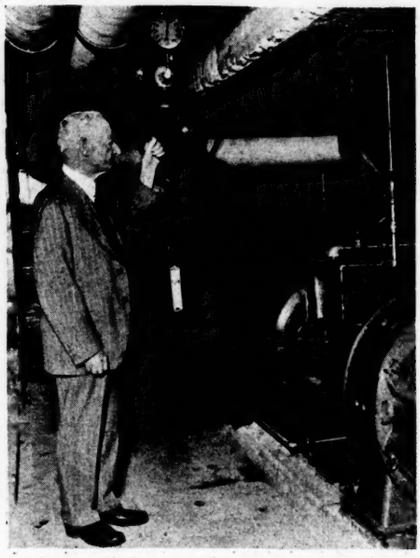
d. Proposals submitted prior to June 15, 1934, shall be subject to the terms and conditions of sale in effect at the time the proposal was drawn, provided acceptance of same is made on or before August 15, 1934.

e. Requests for estimates received on or before June 15 shall be subject to the terms and conditions of sale in effect at the time the request was made, provided the proposal is submitted to the customer on or before June 30, 1934, and acceptance is made prior to September 1, 1934.

Previously, the Boston Consolidated Gas Company in marketing gas-heating equipment had offered equipment without down payment and on 10-year terms. It was against this competitive situation the Boston Oil Burner Associates complained and requested the assistance of the A.O.B.A.

Those in attendance at the meeting when the agreement was reached included the following:

D. J. Edwards, president, and John J. Scott, vice-president, Boston Oil Burner Dealers Associates; A. W. Clark, managing secretary, Dealer Division, A.O.B.A.; Cyrus Barnes, sales manager, Charles H. Tenney & Company; R. J. Rutherford, assistant to vice-president in charge of sales, New England Gas & Electric Association, and D. S. Reynolds, chief engineer, Boston Consolidated Gas Company.



E. C. Dorman, 59-year veteran employe, puts the Chicago Tribune air conditioning system in operation

Chicago Tribune Starts Cooling System

CHICAGO—The *Chicago Tribune* celebrated its 87th birthday June 10 by turning on its modern cooling system, which consists of nearly 400 room units as well as a central plant. The job was designed by Otto W. Armspach with the assistance of Holmes Onderdonk, of the Chicago Tribune Building Department, and John W. Park, production manager for the newspaper. The conditioning system has a capacity of 600 tons a day.

COMING EVENTS

AUGUST 15-24, 1934. *National Schoolmart and National Schoolview Exposition and Conference, New York Port Authority Building, New York. Under the auspices of National Association of Public School Business Officials; Teachers College, Columbia University, and New York University School of Education.*

AUGUST 27-SEPTEMBER 1, 1934. *Second Annual Convention and Show of the National Association of Power Engineers, Minneapolis, Minn.*

SEPTEMBER 19-29, 1934. *Second Annual National Electrical and Radio Exposition, Madison Square Garden, New York.*

OCTOBER 29-NOVEMBER 2, 1934. *Sixteenth Annual Convention and Exposition of the American Gas Association, Atlantic City Auditorium, Atlantic City, N. J.*

DECEMBER 3-8, 1934. *Eleventh National Exposition of Power and Mechanical Engineering, Grand Central Palace, New York.*

N. Y. Engineers Want Minimum Wages

NEW YORK—Minimum wage rates for engineers and for engineering assistants are proposed in a report of the New York County Chapter of the State Society of Professional Engineers. The Kings County Chapter gave its endorsement to the proposal.

Only the lowest grades of engineering services are provided for in this proposal. They are as follows:

1. For the lowest grade of subprofessional engineering work the minimum pay should be $100 a month for a man who has an engineering degree.

2. For the lowest grade of professional engineering work requiring a licensed professional engineer, the minimum pay should be $200 a month.

The above rates were established by the Committee on Fees and Salaries of the New York Chapter.

Bush Plant Busy

HARTFORD, CONN.—Bush Mfg. Company, Inc., maker of finned tubing for cooling and heating installations, is reported as operating with a force of 200 employes on three shifts to meet increased demand for air conditioning equipment.

The Automatic Refrigerating Company here has also experienced a sharp increase in air conditioning activity, making large installations for a number of concerns. The building of Scott Furriers, Inc., Main Street; the first three floors of the Hartford Electric Light Company office building, Pearl Street, and the first floor and basement of G. Fox & Company, Inc., Main Street department store, are among recent installations.

Charles H. Day

CLEVELAND—Charles H. Day, associated with the Cleveland Terminal Building Company, and member of the National District Heating Association, died suddenly June 10 from a heart attack. Mr. Day was 51 years of age.

Born in Providence, R. I., Mr. Day graduated from Worcester Academy in 1900, receiving his M.E. degree from Cornell in 1904, and his M.M.E. degree in 1905. He taught at Carnegie Institute of Technology until 1912, when he joined the Grasselli Chemical Co., Cleveland. He then became connected with the Cleveland Electric Illuminating Company in charge of the steam heating department. In 1927 he became operating manager of the Cleveland Terminal Building.

Mr. Day is survived by his widow and four children.

BUSINESS BRIEFS

HEATING business in April showed an increase more than seasonal, so that HEATING & VENTILATING'S Index of Business Activity, as shown in the accompanying graph, increased sharply.

Reports covering the construction industry continue to be somewhat misleading inasmuch as the gains shown are of some magnitude. Unfortunately for the heating industry, however, the gains in construction are largely those in heavy engineering, such as dams, highways, and similar projects, and not in building. Preliminary reports for the first half of June covering building contracts indicate that residential building will show about a 25% increase over the corresponding month last year, while non-residential building may drop as much as 10% from last year.

The following tabulation shows the increases recorded in the heating and ventilating industry for the first several months of 1934 relative to 1933, as indicated by equipment sales. The sharpest increase was that in cast-iron convectors, although notable gains were also registered by oil burners, stokers, square boilers, unit heaters, unit ventilators, unit air conditioners, propeller fans, and non-ferrous heating surface. Sales of all items of equipment show gains over the same period last year.

EQUIPMENT SALES

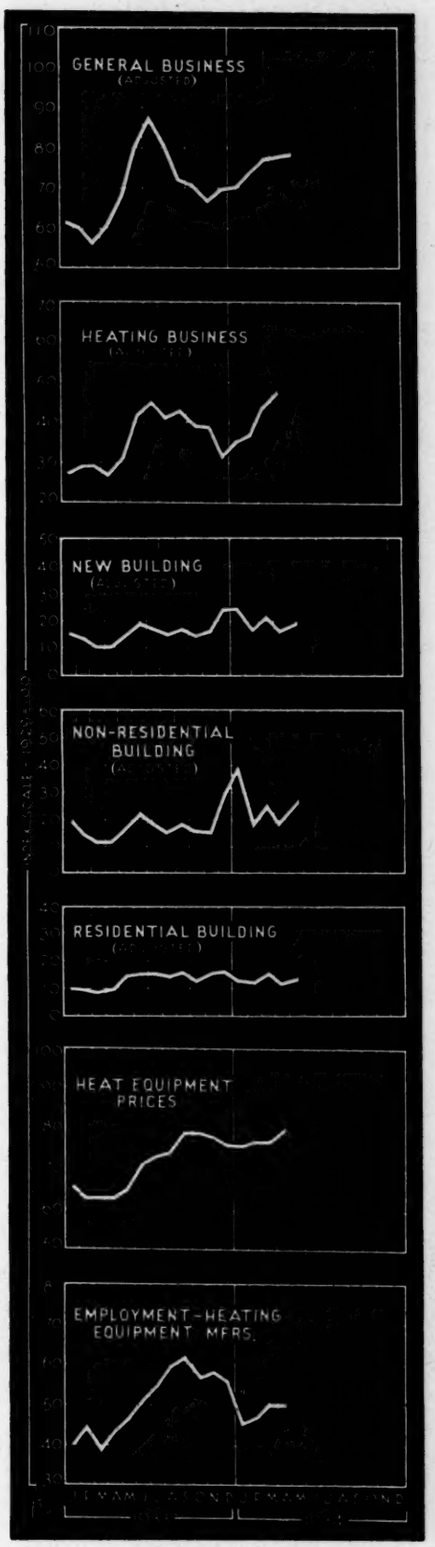
	4 Mo. 1934	4 Mo. 1933
Oil burner, No.	14,218	9,574
Steel boilers, No.	551	424
Stokers, No.	2412	1369
C.I. convectors, 1000 Sq. Ft.	306	49
Non-ferrous convectors, 1000 Sq. ft.	646	545
	5 Mo. 1934	**5 Mo. 1933**
C.I. radiators, Million Sq. Ft.	12.29	8.92
Square boilers, Million Lb.	41.87	27.71
Round boilers, Million Lb.	13.93	10.20
Unit heaters, $1000	791.8	283.1
Unit Ventilator, $1000	370.1	171.7
Unit air conditioners, $1000	622.9	206.7
Air washers, $1000	205.6	142.6
Blowers, $1000	244.6	163.4
Propeller fans, $1000	110.6	241.2
C.I. heating surface, $1000	27.1	21.9
Non ferrous heating surface, $1000	346.3	146.1

ACCORDING to data released by the Coal Division of the Bureau of Mines recently, 10,491,037 tons of coke were used for domestic purposes in this country in 1933. Figures (in tons) for previous years are:

1923—2,733,414
1929—7,511,023
1931—8,495,317
1932—9,630,200

WASHINGTON'S first entirely commercial building to be air conditioned is the Raleigh Haberdasher. A Carrier system, with glass wool filters, is installed.

Business Trends



Above charts marked "adjusted" are those in which corrections have been made for seasonal variation. The heating business chart is that of HEATING AND VENTILATING'S Index of Heating Business Activity. New building figures are from F. W. Dodge Corp.

A THREE-POINT program is outlined in a three-year report published by the Pittsburgh Housing Association, of which Joseph P. Tufts is director. The report outlines: Reconstruction of slum or decadent areas, provision of low-cost housing, and vigorous enforcement of housing and sanitary laws.

As pointed out in the report, reconstruction of slum areas is different from mere clearance. It involves developing the site for a use that will be of economic and social value to the community.

The reconstructed slum or decadent area may become a commercial or an industrial area, or a decadent residential area may be converted into a park or playground.

While admitting the possibility of Pittsburgh's having a surplus of dwellings, if quality is disregarded, the report avers:

"We have a great surplus of building sites in terms of past intensive use of land. As a result, our problem in the future will be to learn how we may provide every person with as much land as he can effectively use, not, as in the past, as little as he can exist upon.

"In the light of these facts, it is foolish to count upon a revival of predepression industries (industries that even in 1928 were discharging men because of technological improvements) to restore the rent rolls of outworn buildings in our old, overcrowded districts.

"Any hope that property there will again pay its way must be based upon large scale reconstruction."

THERE were 93,400 customers using gas for house-heating on the lines of manufactured gas utilities in April, an increase of 57% over the number on the lines in April, 1933, according to the statistical department of the American Gas Association.

THE rise of construction costs to the 1930 level is described in a recent Dow Service Daily Building Report by Myron L. Matthews, who attributes the increase to the effect of NRA codes.

The figures are based on material and labor costs and show that a home on which these items totaled $5,000 in 1926 varied in successive years about as follows:

1926	$5,000	1932	$3,700
1927	4,975	April, 1933	2,560
1928	4,970	July, 1933	2,750
1929	5,015	October, 1933	3,340
1930	4,965	January, 1934	4,060
1931	4,200	March, 1934	4,675

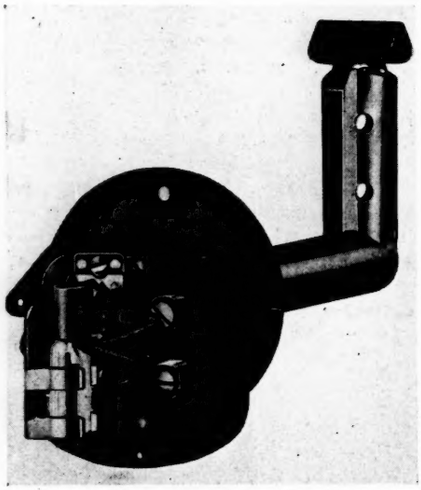
NEW EQUIPMENT

Mercoid Gas Pilot Control

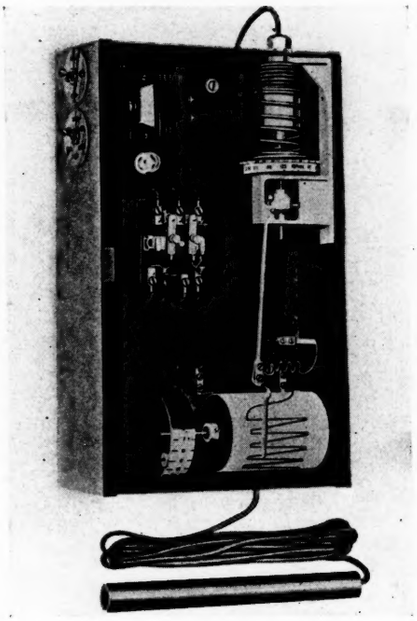
Powerstat, an automatic gas pilot control, is being offered by The Mercoid Corp., 4201 Belmont Ave., Chicago. The purpose of the device is to close the main gas valve in case the pilot becomes extinguished. With the Powerstat, the opening or closing of the circuit ranges from 3 to 5 sec., depending upon the adjustment.

The device is shown in perspective in the accompanying illustration. To the right is shown the shield surrounding the pilot. Over the pilot, but not shown, is a horseshoe-shaped element, on the inner edge of which the flame from the pilot plays. The expansion and contraction of this element is what controls the electric circuit, the unusual feature being that the change in the expansion of the element does not function from temperature changes but from the difference in temperature between the inner edge and the outer edge. When the pilot is off, the same temperature surrounds the whole element, whereas while the pilot is on, the inner edge of the element is at a higher temperature and, consequently, maintains the circuit which holds the main valve open.

The Mercoid switch is of special construction and remains fixed in position and operates by a magnetic attraction through the glass. A small permanent magnet is actuated by the Powerstat element through an over-travel clutch mechanism. When the pilot is lighted, the magnet is held close to the side of the glass switch. By means of the magnetic attraction, the electric circuit is held closed. If the gas pilot fails, the magnet quickly moves away from the switch and the circuit opens.



Mercoid Powerstat



Jas. P. Marsh Tritrol

Marsh Tritrol

The Marsh Tritrol heat regulator is being distributed by the Jas. P. Marsh Corp., 2073 Southport Ave., Chicago. This is a thermostatic device which automatically varies the time of starting the heating system in the morning and the time for shutting it down at night to compensate for changes in the outside temperature. During the day it maintains an intermittent flow of heat to the building, the flow being adjusted according to the weather.

It may be used in connection with oil burners, stokers, gas boilers, district steam, or other automatically-controlled sources of heat. It also has an application in zoning.

The thermostat is a liquid-filled bulb, installed on an outside wall. A bracketed hood is provided to support the bulb and protect it.

This control cabinet, housing all of the control apparatus, is installed inside of the building wherever convenient. A protected capillary tubing connects the outside bulb to a metallic flexible bellows in the control cabinet, to which is directly connected a cam shaft through a swivel joint. A compound cam is affixed to this shaft. Pivoted to a supporting bracket is a lever, one end of which rides on the cam and the other end of which contacts a rotating contact drum. The drum is caused to rotate a complete revolution in 24 hr. by a clock mechanism. This drum is made up of two sets of contact areas insulated one from the other, so designed that the rotation of the drum causes first an area of one set to be contacted by the contact lever and then an area of the second set to be contacted by this lever.

As the outside temperature drops, the liquid in the outside bulb contracts. This causes a contraction of the flexible bellows in the control cabinet. As this bellows contracts the attached cam is drawn upward which causes the contact lever to be moved across the face of the contact drum. When the outside temperature rises, the liquid in the outside bulb expands causing the bellows to expand, lowering the cam. A tension spring maintains constant contact between the cam and lever.

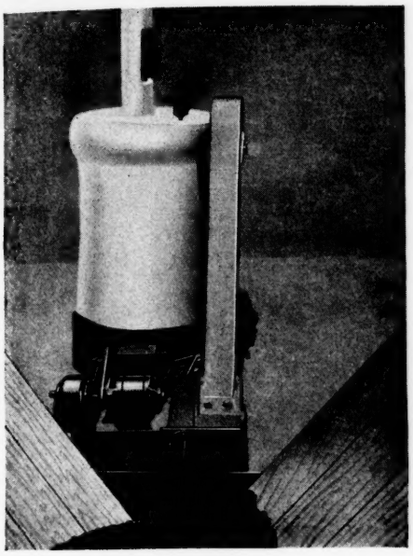
The contact drum has shaded portions which, when contacted by the lever, cause an electrical circuit to be completed which opens the control valve. The remaining portion indicates those areas which, when contacted, cause an electrical circuit to be completed which closes the control valve.

The periods of operation and quiescence are pre-calculated, and from these calculations the drum is designed. A compensator is provided by means of which manual adjustment is made for conditions other than normal and not provided for automatically.

Humidi-Cooler

The Humidi-Cooler Corp., 72 Water St., West Haven, Conn., has announced the Humidi-Cooler, a humidifying device which delivers air horizontally in every direction. It stands but 5½ ft. high and is said to be sufficient to supply from 400 to 600 sq. ft. of floor space.

Humidifying Fan



C-B-F Stoker

C-B-F Overfeed Stoker

Cameron, Briggs & Fencher, Inc., 305 East 45th St., New York, has introduced the C-B F automatic overfeed stoker for use with coal-burning boilers up to 28 in. in diameter. The unit handles from 5 to 40 lb. of coal per hour. A feature is the provision for intermittently or continuously feeding fuel to produce a required amount of heat, as determined by demand of the control.

Other features of the device are a conveyor chute to the fire door and the mechanism for controlling the operation of the drive. The stoker can be installed on the left or right side of the boiler. A helical worm feeds the fuel from a bin to the base of the conveyor on which is mounted a motor and fan. A duct leads to the boiler ashpit, and attached to it is a variable speed reducing gear unit, with necessary shafts and couplings. Secured to one of the shafts is the grate shaking mechanism, provided with special grates that grind the ashes. The shaft also operates a worm to remove the ashes from the boiler ashpit to a pit or container adjacent to the boiler.

On the flange of the fuel door opening is attached a member of the same diameter that extends outward to permit the insertion of a cylinder member to allow passage of the fuel to an internal spreader secured in the member mounted on the fuel door.

Bayley Aeroplex Fan

Bayley Blower Co., Milwaukee, Wis., is marketing a Type AP Aeroplex fan for ventilation application. The feature of the wheel design is the backwardly-curved floats and the taper shrouds on the inlet side. The blade forms a very small angle with the periphery, which is said to give the fan a high-speed characteristic, while the taper accounts for a high dynamic efficiency. The characteristic of this type of design is a slow-rising delivery curve and a non-overloading power curve. The power consumption remains practically constant even when the resistance is dropped sharply.

The wheel is made in three designs: No. 1 is for ventilation with maximum operating speed of 7500 f.p.m.; design No. 2 is for medium pressures with maximum tip speeds of 10,000 f.p.m.; while design No. 3 is suitable for forced draft work with tip speeds up to 15,000 f.p.m.

Frick Freon Compressors for Air Conditioning

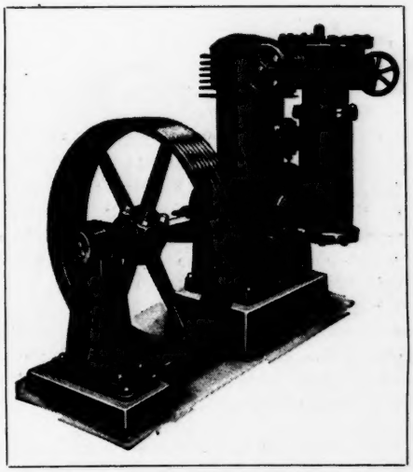
A new line of enclosed-type freon compressors, designed particularly for air conditioning work and ranging in size from 15 to 300 tons refrigerating capacity, is announced by the Frick Company, Waynesboro, Pa.

These compressors are all furnished with twin vertical cylinders, single-acting. Wide fins are necessary. Plate-type valves are used for both the suction and discharge, in the cylinders.

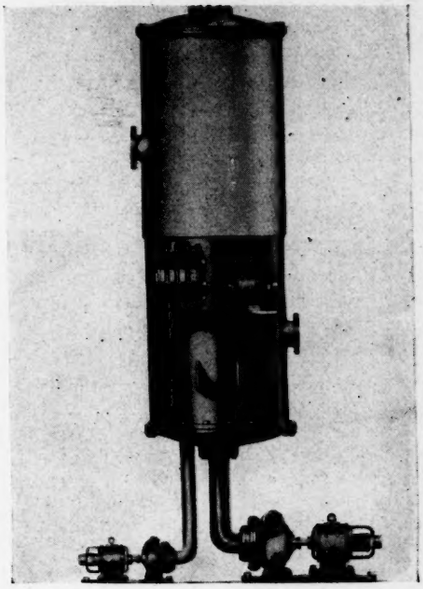
Each machine is fitted with a force-feed lubricating system; the oil pump is located in the bottom of the crankcase and is driven by an internal chain from the crankshaft. The oil coming back with the suction gas is separated by the large trap beneath the manifold, and is returned to the crankcase.

Either V-belts or direct synchronous motor drives are used as standard. All except the two smallest machines have outboard bearings beyond the flywheels.

Thirteen of these machines, with a total refrigerating capacity of more than 500 tons, are now operating in the city of Baltimore, and form a good indication of the activities in air conditioning work this season.



Frick Freon Compressor



Elliott Steam Jet

Elliott Steam Jet Cooler

The Elliott steam-operated cooler has been announced by the Elliott Co., Pittsburgh, for supplying cooled water for use in unit or central air conditioning systems and for drinking purposes and other applications where water cooled from 40° to 50° is desired. The device is of the steam-jet type.

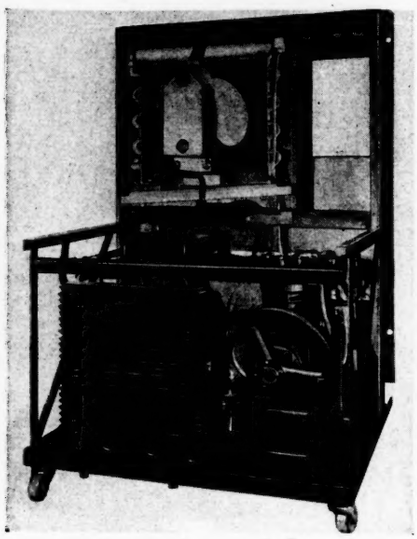
The Elliott unit is unusual in that it is made in small sizes. It is available in three capacities, the largest of which is rated at 15 tons of refrigeration. The unit can be installed in a space less than 3 ft. square and 8 ft. high. Larger commercial units for any capacity are available in a less compact arrangement.

Within the tank is a low-pressure evaporating compartment, a compressor of the steam-jet type, and a condenser. The exterior of the tank has one pump for removing and circulating the cooled water and another pump whose function is to remove the condensing water from the condensing compartment. An auxiliary motor-driven vacuum pump is mounted on the side of the unit for the purpose of maintaining a moderately reduced pressure in the condensing compartment.

Ellison Portable Analyzer

Ellison Draft Gage Co., 214 West Kinzie St., Chicago, has placed on the market a new portable gas analyzer, the header and seats of which are made of hard rubber, which is corrosion proof, even with cuprous chloride. The scale is of white celluloid with black graduations with readings visible at a distance of several feet.

The apparatus is contained in a carrying case made of rust-resisting furniture steel, dull-finish chromium plated.



Crosley Bed Conditioner

Crosley Coolrest

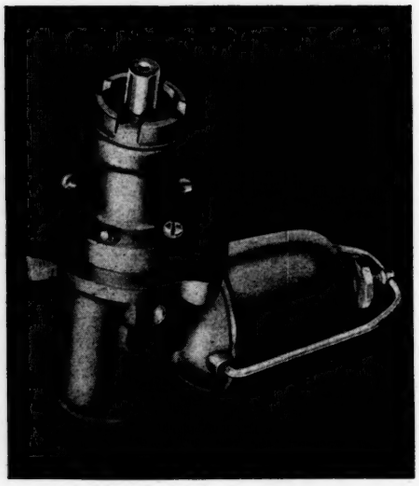
The Crosley Radio Corp., Cincinnati, has placed on the market the Coolrest, an air conditioned bed canopy. The outfit consists of a mechanical cooling unit which faces the bed and supplies cold and dehumidified air under the canopy.

The cooling unit is of rust-proof plated brass with the motor, compressor, and condenser mounted on a coiled spring suspended base to eliminate vibration and noise.

The unit is sold for $150, delivered, and operating costs are said to be low since the unit has a ¼-hp. motor.

Sundstrand Automatic Fuel Unit

An automatic fuel unit for pressure atomizing oil burners has been added to the line of rotary pumps manufactured by the Sundstrand Machine Tool Co., Rockford, Ill.



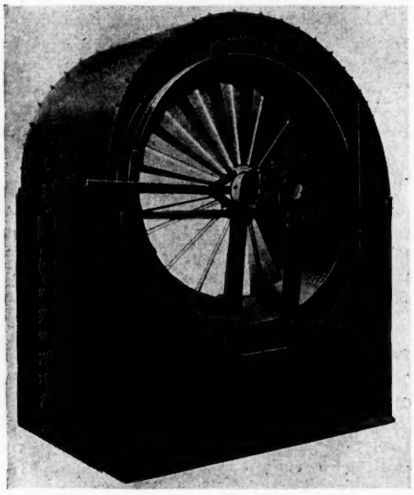
Sundstrand Pump and Strainer

The unit consists of a variable displacement pump and a strainer, the variable displacement pump automatically taking care of the work done by valves, thus entirely eliminating all of the valve mechanism previously required to operate a pressure-type oil burner.

The pump displaces, with no bypassing, only as many gallons of fuel per hour as is determined by the nozzle size, the pump automatically pumping the correct volume without requiring any adjustment for different sized nozzles. Automatic air relief or air bleed is also incorporated.

Clarage Vortex Control

Clarage Fan Co., Kalamazoo, Mich., has developed the Vortex Control for use in connection with an air handling or air conditioning system when it is desired to periodically or continually change the volume of air delivered by the fan. Savings are claimed in operating costs due to the lowering of

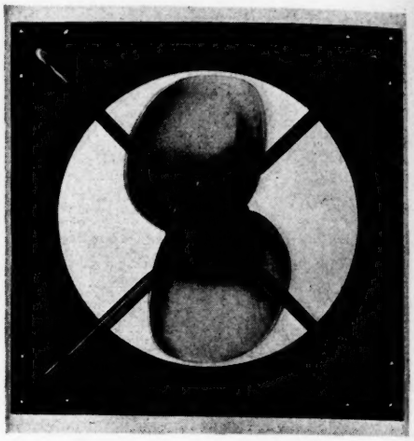


Vortex Control on a Clarage Ventilating Fan

power consumption by using this control as compared with the damper control method, while first cost is reduced below the cost of variable speed motors.

The control derives its name from the fact that the device is placed in a fan inlet and imparts a rotary motion to the incoming air. It reduces the volume of air handled by reducing the relative speed of the fan wheel with relation to the air entering the fan. By moving the blades of the control a fan operating at constant speed is given the characteristics of a fan operating at a variable speed, and the fan characteristic becomes the same as the system characteristic.

The control is available in two types, one adjustable and the other stationary.



Ventura Propeller Fan

ABC Ventura Fans

American Blower Corp., Detroit, is marketing a line of fans designated as the new Ventura, available in eight sizes, delivering 965 to 15,500 c.f.m.

The design of the blades of these fans is a radical departure from the conventional type. It is the result of an endeavor to produce a blade which will handle more air with minimum consumption of power. The blade is epicycloidal in shape. The fan has a streamline inlet which also acts as the discharge outlet. Motors are suspended in a patented steel spring mounting to absorb vibration and electrical hum.

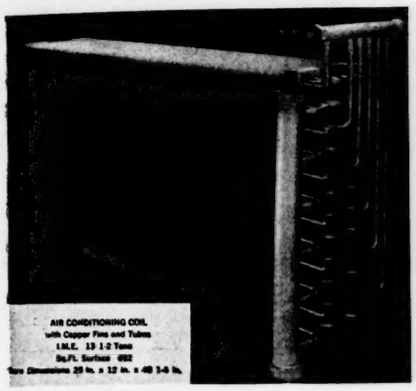
The fans are built with a die-formed furniture steel square panel finished in green or gray. Motors are two-speed, totally enclosed and furnished with a two-speed controller.

Arco Heater Cleaner

A "one-man" portable boiler and furnace cleaner, weighing 30 lb., has been placed on the market by the Arco Vacuum Corp., division of the American Radiator & Standard Sanitary Corp., New York.

Mounted on four casters so that it can be moved easily, the cleaner is sold complete with 10 standard attachments for all general work. The unit has a 3/5-hp. Universal motor, and can be used with 110, 220, or 250 volts. Tests have shown that it will remove 1 lb. of loose dirt every 5 sec.

Arco Portable Cleaner



Fedders Heat Transfer Coil

Fedders Coils

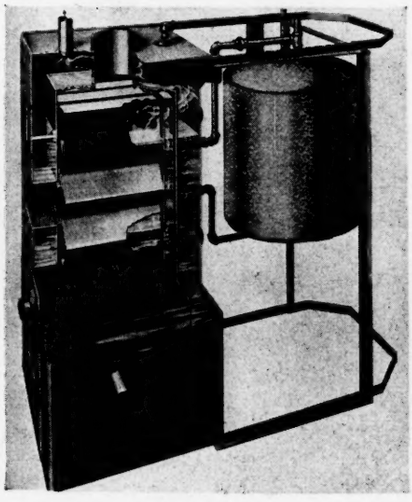
Fedders Manufacturing Co., Inc., Buffalo, N. Y., has introduced a complete line of heating and cooling coils of unlimited tonnage for use in all types of air conditioning apparatus. Coils are available with either flat or corrugated copper fins according to the type of installation. To provide for sustained heat transfer efficiency, the copper fins and tubes are joined with the Fedders fused metal-to-metal bond. The coils are available for use with all standard refrigerants.

Waterfilm Boilers

Waterfilm Boilers, Inc., 154 Ogden Ave., Jersey City, N. J., has introduced the Waterfilm boiler for oil burners. The boiler consists of several generators holding a small quantity of water that steams quickly. These generators are enclosed in and connected to an outer water jacket or pre-heating boiler that holds a large quantity of water that cools slowly. The boilers are so constructed that they can easily be cleaned

The boilers are jacketed and insulated and there is a pyrex glass window through which the fire can be seen. A copper coil is included for heating domestic water.

The boiler is available in two models —for gun-type burners or for rotary-type burners. The de luxe model is made in three sizes with capacities of 600 to 1200 sq. ft. of steam radiator or equivalent in water, while the sectional boilers are made in 30 sizes with capacities from 1500 to 15,000 sq. ft. of steam radiator or equivalent.

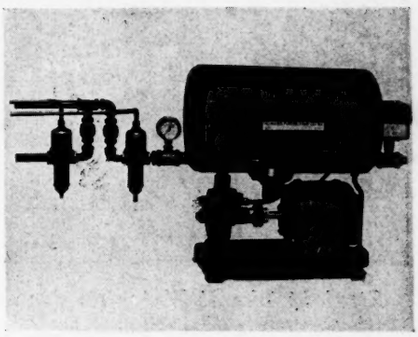


Waterfilm Boiler

Richmond Well Water Cooling Systems

Richmond Turbine Pump Co., Inc., 800 South 7th St., Richmond, Ind., is offering automatic well water pumping systems for supplying cooling water for air conditioning and refrigerating apparatus. They are known as Magic Wonder water systems.

Shallow well type systems are furnished in three sizes with capacities of 300, 450, and 600 gal. per hr. As the pumps will supply their rated capacities continuously, there is no need for large storage tanks. The tank on the small model holds only 6 gal.



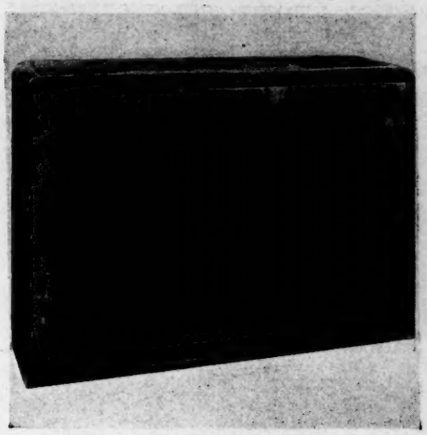
Richmond Well Water System

The pumps are so constructed that the impeller runs entirely in water and touches no metal. The characteristics differ from those of other centrifugal pumps inasmuch as when the head falls, the capacity increases only slightly and the power requirements are reduced.

The small model has a special attachment for use where it is doubtful that the well will supply sufficient water for the purpose. For this condition, a permanent connection is made to the city water line. Whenever the well supply runs short, the compressor head pressure goes up and opens a water regulating valve allowing city water to flow into the system.

Savage Arms Zephyr A. C. Units

A line of air conditioning room units has been announced by the newly-formed Air Conditioning Division, Savage Arms Corp., 100 East 42nd St., New York. At present the line consist of two units, one being the Zephyr 60, an all year 'round conditioner, self-contained with refrigeration, while the Zephyr 60A is furnished without cooling but refrigeration may be added at a later date by the buyer if he desires.



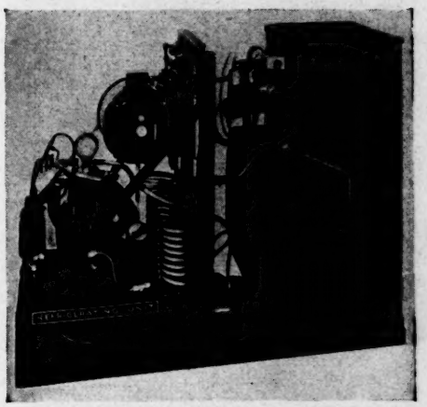
Zephyr 60

The cooling unit is equipped with a two-cylinder compressor with a capacity of 7000 to 9000 B.t.u. per hr., and having a water-cooled condenser of the double coil type. Heating is not included as standard equipment but on order the unit will be furnished with copper fin heating surface directly below the air discharge and with a capacity of 40 sq. ft. of radiator.

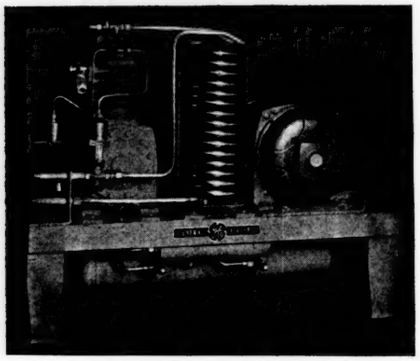
The unit will evaporate from 4 to 16 gal. of water per 24 hr., depending on the temperature of the spray water. Humidification is obtained by use of a washer which also acts as the air cleaner. The air-handling capacity of the unit is 250 c.f.m., drawn from the floor level and discharged from the top of the unit at an angle of 30° from vertical.

The cabinet with casing measures 32 in high; 48 in. wide, and 17 in. deep. .

The Zephyr 60A, which contains the air washer only, is 26 in wide, 32 in. high, and 14 in. deep.



Interior of Zephyr 60



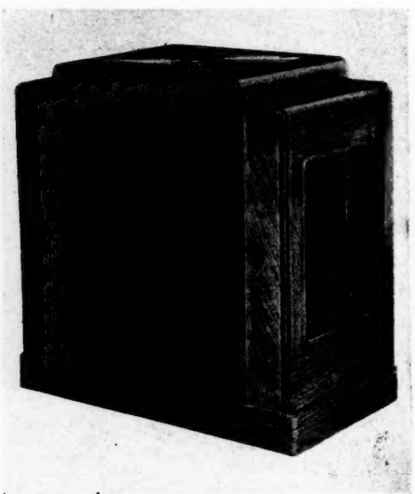
G.E. Condensing Unit

G.E. Room Coolers and Air Conditioners

Additional air conditioning products for domestic and commercial use have been announced by General Electric Company. The new line includes portable room coolers, floor-mounted room coolers, wa'l mounted room coolers, and suspended-type store coolers; three new types of room air conditioners, and a line of condensing units ranging from ½ hp. to 20 hp. The 1½, 7½, 15, and 20-hp. units are new additions to the line of condensing units offered last year.

The floor- and wall-mounted room coolers use an aphonic pressure-type propeller fan and have a cooling rating of 7500 and 15,000 B.t.u. per hr., respectively. Each is finished in dull satin walnut, and is equipped with ornamental grilles through which the air is discharged.

The portable room cooler is self-contained and requires a water and an electric connection for operation. In appearance, it resembles the floor-mounted units, but is equipped with large diameter casters so that it can be wheeled from one room to another if desired. The unit is quiet and has a cooling rating of 4200 B.t.u. per hr.



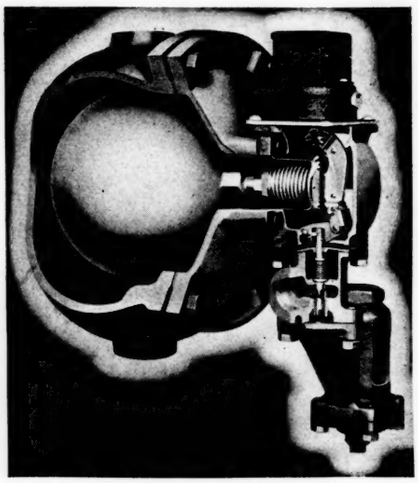
G.E. Room Cooler

The room air conditioners come in two sizes, with approximately 7500 and 15,000 B.t.u. per hr. cooling ratings, respectively.

The condensing units follow the same general design as former units with the exception of the 15 and 20-hp. units which have a shell and tube condenser instead of the concentric-tube type.

McDonnell Straight Thrust Feeder

McDonnell & Miller, 1306 Wrigley Bldg., Chicago, has announced a straight thrust valve safety feeder, designated as No. 51 and No. 47. The No. 47 is designed for boilers up to 5000 sq. ft.; a modified unit 47-2, is designed for automatic jobs and includes a switch; the No. 51 is designed for boilers with capacities above 5000 sq. ft., and is also available in Model 51-2, combining the safety feeder and low water cut-off.

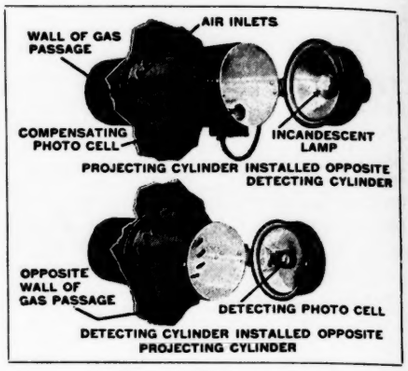


Straight Thrust Water Feeder

Features of the feeder are a compound leverage mechanism which doubles the effective closing power of the float, and a cam and roller action which gives a straight thrust to the valve. The manufacturer claims that this is the first time a straight thrust has been applied to a boiler feed valve.

Bailey Smoke Recorder is Compensated

A photo-cell smoke density recorder compensated for variations in light source intensity and operated by the Galvatron electronic relay circuit has been announced by Bailey Meter Co., Cleveland. This equipment consists of a receiving element in the form of an attractive recorder which is usually mounted on the indvidual boiler panel board and a transmitting element consisting of a projecting cylinder and a detecting cylinder which are mounted on opposite sides of the breeching or flue gas passage.



Bailey Smoke Recorder

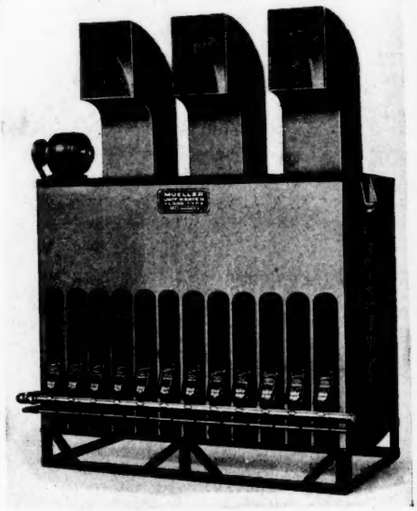
A continuous record of relative smoke density is made by the recorder on a 12-in. uniformly graduated recording chart.

Mueller Unit Heater

A floor-type gas-fired unit heater is being marketed by the L. J. Mueller Furnace Co., Milwaukee, Wis. The unit, also available in the suspended type, is designed for industrial plants, auditoriums, skating rinks, and similar space-heating applications.

The units are composed of assemblies of heating sections, each with individual burner and pilot. They can be operated with full air volume but with only a portion of the heating sections in operation so as to secure more uniform temperature control. A safety pilot is used in each section. The fan motor is started and stopped when the electric gas valve is opened and closed. The units are made of pressed copper bearing steel, seam-welded.

They are available in 15 sizes with capacities from 210,000 to 700,000 B.t.u. per hr. output and with air deliveries from 2500 to 10,000 c.f.m.

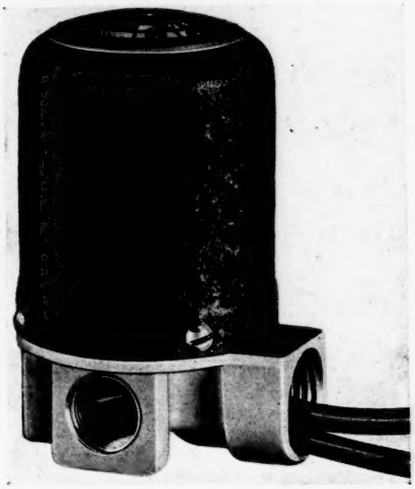


Mueller Gas Unit Heater

Automatic Products Refrigerant Control Valve

The Model 73-R refrigerant control valve has been announced by the Automatic Products Co., 121 North Broadway, Milwaukee, Wis. The valve is designed for the control of methyl chloride, freon, and other refrigerants which will not attack the materials used in the valve. Applications include the control of refrigerant to individual evaporator cabinets located in different rooms and working off a central compressor unit.

The valve is of the solenoid type. The body is a brass forging. A monel metal valve stem closes against a special alloy seat which is pressed into the body. The valve stem is opened and closed by the action of a movable plunger, which is not attached directly to the valve stem but moves a short distance and against momentum before it raises the valve stem itself. Due to the use of this impact-type plunger, the valve will open easily under high pressure. The coil is completely sealed with a plastic material to keep out moisture.



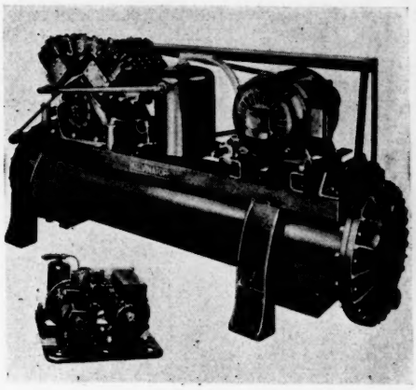
73-R Refrigerant Control Valve

The cover is black crackle finish and encloses the entire coil. Power consumption is approximately 12 watts.

The valve is made in one type, straight-through style. It is available for nine different current characteristics.

Kelvinator Air Conditioning Units

Kelvinator Corp., Detroit, announces a complete line of air conditioners and condensing units, with capacities of ½ to 20 tons of refrigerating effect per 24 hr. The conditioners are available in three types: floor, self-contained, and suspended units. The floor, self-contained, and eight of the suspended-type units may be equipped with heating coils and humidifying sprays for winter and summer air conditioning.



Kelvinator Condensing Unit

There are six models available in the self-contained type having capacities from ½ to 2 tons. These units have all the apparatus within one cabinet and are designed for small offices and single rooms.

For medium-sized offices, small retail stores, and restaurants, the floor unit is recommended. They have capacities of from ½ to 2 tons and are used with remote condensing units.

Suspended units are for use in large offices, restaurants, stores, or in any place where floor space is at a premium. There are 11 of these with capacities from ½ to 8 tons and are for connection with a remotely-located condensing unit.

Condensing units are available in 16 sizes, from ½ hp. to 20 hp., having capacities from 0.4 to 20 tons per 24 hr. Five sizes, from ½ hp. to 2 hp., are air cooled while the remaining 11 are water cooled.

Kauffman Adds to A.C. Line

Kauffman Air Conditioning Corp., 4485 Olive St., St. Louis, is marketing a line of air conditioning equipment, including a unit air conditioner in both ceiling and floor types, extended surface cooling and heating coils, water-cooled compressor units, and a line of air filters.

Floor-type conditioners are available in both Types K and L, the former being a ½-ton unit, the latter a one-ton unit.

The ceiling-type conditioners are available in two styles, one being available in three sizes with cooling capacities from 24,000 to 72,000 B.t.u. per hr. and heating capacities from 78,000 to 234,000 B.t.u. per hr. The other model is available in eight sizes with capacities from 450 to 1700 c.f.m.

The company's line of compressor units uses methyl chloride as a refrigerant, has shell and tube-type condensers, and operates on a suction pressure of 28 lb. The line covers 10 sizes with capacities from 6,000 to 18,000 B.t.u. per hr.

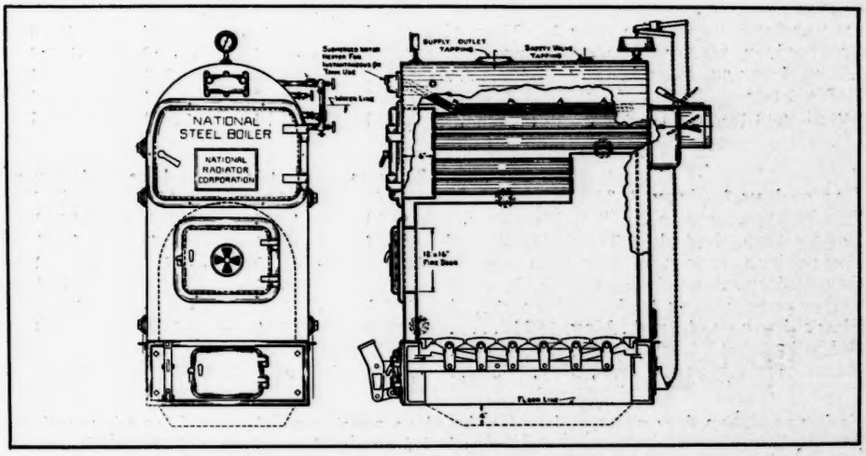
The extended heat transfer surface is designed for freon, methyl chloride, sulphur dioxide, water or steam. Both the tubes and extended surface are of copper.

Kauffman air filters are made in both Type A and Type B, the former being made of short-fiber glass, the latter of long-fiber glass. The A models are 2 in. thick, the B, ¾ in. thick. Both types are available in three sizes —16 in. by 20 in., 16 in. by 25 in., and 20 in. by 20 in.

National Radiator Adds to Steel Boiler Line

National Radiator Corp., Johnstown, Pa., has extended its line of National Premier steel boilers, these units now being available also in 25 in. and 31 in. models.

The line has been designed for three types of fire: Type OB is intended for oil-firing, Type DB for hand-firing, and Type MB for stoker-fired installations. The units are all of the double-pass horizontal fire-tube type and have ratings ranging from 485 to 2710 sq. ft. of steam radiation.



National Steel Boiler for Hand Firing

Degree-Days for Eastern Cities Running Above Last Year

May, 1934

	Atlanta	Baltimore	Birmingham	Boston	Buffalo	Chicago	Cincinnati	Cleveland
Degree-days for May, 1934	18	69	4	173	262	117	69	147
Degree-days, Sept. 1, 1933 to May 31, '34	2850	4773	2279	6466	7353	6081	5052	6183
Degree-days, Sept. 1, 1932 to May 31, '33	2821	4058	2470	5193	6265	6057	4811	5412
Comparison, season to date with last, %	+ 1	+ 17.8	— 7.8	+ 24.9	+ 17.2	+ 0.2	+ 5.0	+ 14.1
Degree-days, Sept. 1 to May 31, Normal	2890	4533	2352	6045	6810	6290	4703	6155
Comparison, season to date with nor'l, %	— 1.4	+ 5.6	— 3.0	+ 7.1	+ 8.0	— 3.3	+ 7.4	+ 0.3
Lb. coal per sq. ft. rad., May, 1934.....	0.144	0.552	0.032	1.384	2.096	0.936	0.552	1.176
Gal. oil per sq. ft. rad., May, 1934.....	0.012	0.047	0.003	0.119	0.180	0.080	0.047	0.101
Cu. ft. gas per sq. ft. rad., May, 1934...	1.73	6.62	0.38	16.61	25.15	11.23	6.62	14.11

	Davenport	Dayton	Denver	Des Moines	Detroit	Duluth	Fort Wayne	Grand Rapids
Degree-days for May, 1934	43	93	102	38	179	405	109	143
Degree-days, Sept. 1, 1933 to May 31, '34	5907	5529	4243	5941	6818	9628	6341	6897
Degree-days, Sept. 1, 1932 to May 31, '33	6041	5094	6012	6391	6089	9521	5942	6320
Comparison, season to date with last, %	— 2.2	+ 8.7	— 29.5	— 7.0	+ 12.1	+ 1.1	+ 6.9	+ 9.1
Degree-days, Sept. 1 to May 31, Normal	6289	5264	5874	6384	6490	9245	5934	6535
Comparison, season to date with nor'l, %	— 6.0	+ 4.9	— 27.7	— 6.8	+ 5.1	+ 4.2	+ 7.0	+ 5.7
Lb. coal per sq. ft. rad., May, 1934.....	0.344	0.744	0.816	0.304	1.432	3.240	0.872	1.144
Gal. oil per sq. ft. rad., May, 1934.....	0.029	0.064	0.070	0.026	0.123	0.278	0.075	0.098
Cu. ft. gas per sq. ft. rad., May, 1934...	4.13	8.93	9.79	3.65	17.18	38.88	10.46	13.73

	Harrisburg	Hartford	Indianapolis	Kansas City	La Crosse	Los Angeles	Louisville	Memphis
Degree-days for May, 1934	110	157	72	33	97	15	40	5
Degree-days, Sept. 1, 1933 to May 31, '34	5754	6483	5489	4369	7121	834	4400	2886
Degree-days, Sept. 1, 1932 to May 31, '33	5006	5452	5242	4874	7358	1461	4273	3070
Comparison, season to date with last, %	+ 15.0	+ 18.9	+ 4.9	— 10.2	— 3.3	— 43.0	+ 3.0	— 6.0
Degree-days, Sept. 1 to May 31, Normal	5375	6036	5298	4852	7322	1504	4180	2950
Comparison, season to date with nor'l, %	+ 7.0	+ 8 0	+ 3.6	— 10.0	— 3.8	— 44.6	+ 5 2	— 2.1
Lb. coal per sq. ft. rad., May, 1934.....	0.880	1.256	0.576	0.264	0.776	0.120	0.320	0.040
Gal. oil per sq. ft. rad., May, 1934.....	0.075	0.108	0.049	0.023	0.067	0.010	0.027	0.003
Cu. ft. gas per sq. ft. rad., May, 1934...	10.56	15.07	6.91	3.17	9.31	1.44	3.84	0.48

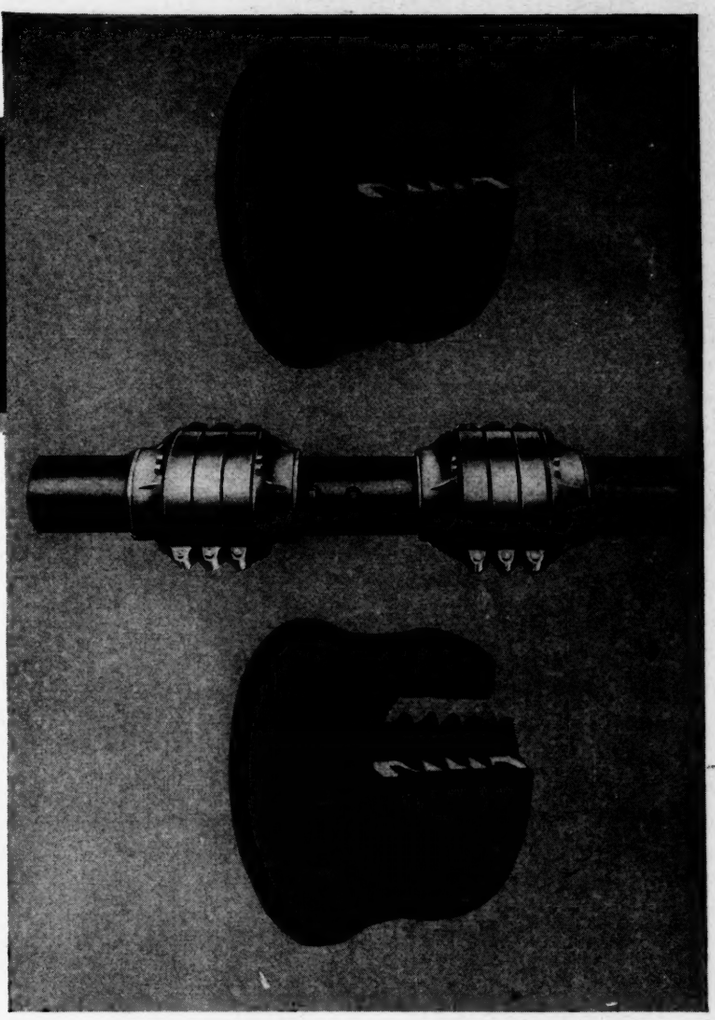
	Milwaukee	Minneapolis	New Haven	New Orleans	New York	Omaha	Peoria	Philadelphia
Degree-days for May, 1934	188	86	172	—	122	13	58	70
Degree-days, Sept. 1, 1933 to May 31, '34	6774	7587	6239	854	5673	5377	5814	5016
Degree-days, Sept. 1, 1932 to May 31, '33	6813	7867	5304	1093	4775	5954	5777	4196
Comparison, season to date with last, %	— 0.6	— 3.6	+ 17.8	— 21.8	+ 18.9	— 9.5	+ 0.8	+ 19.4
Degree-days, Sept. 1 to May 31, Normal	7206	7850	5895	1024	5347	6131	6109	4855
Comparison, season to date with nor'l, %	— 6.1	— 3 3	+ 6.0	— 16.6	+ 6.1	— 12.2	— 4.8	+ 3.2
Lb. coal per sq. ft. rad., May, 1934.....	1.504	0.688	1.376	—	0.976	0.104	0.464	0.560
Gal. oil per sq. ft. rad., May, 1934.....	0 129	0.059	0.118	—	0.084	0.009	0.040	0.048
Cu. ft. gas per sq. ft. rad., May, 1934...	18.05	8.26	16.51	—	11.71	1.25	5.57	6.72

	Pittsburgh	Portland, Ore.	Providence	Reading	Rochester	St. Louis	Salt Lake City	San Francisco
Degree-days for May, 1934	109	143	166	113	205	24	63	148
Degree-days, Sept. 1, 1933 to May 31, '34	5722	3162	6005	5582	7109	4426	3967	2004
Degree-days, Sept. 1, 1932 to May 31, '33	5054	4469	5362	4821	5932	4453	6353	2757
Comparison, season to date with last, %	+ 13.1	— 29.3	+ 12.0	+ 15.9	+ 20.2	— 0.6	— 37.5	— 27.2
Degree-days, Sept. 1 to May 31, Normal	5235	4379	6014	5389	6732	4585	5555	2682
Comparison, season to date with nor'l, %	+ 9.3	— 17.8	— 0.2	+ 3.6	+ 5.8	— 3.5	— 28.6	— 25.3
Lb. coal per sq. ft. rad., May, 1934.....	0.872	1.144	1.328	0.904	1.640	0.192	0.504	1.184
Gal. oil per sq. ft. rad., May, 1934.....	0.075	0.098	0.114	0.077	0.141	0.016	0.043	0.101
Cu. ft. gas per sq. ft. rad., May, 1934...	10.46	13.73	15.94	10.85	19.68	2.30	6.05	14.21

	Scranton	Seattle	Spokane	Syracuse	Toledo	Trenton	Washington, D. C.	Wichita
Degree-days for May, 1934	170	208	189	187	142	124	71	35
Degree-days, Sept. 1, 1933 to May 31, '34	6560	3657	4861	7099	6499	5783	4785	3908
Degree-days, Sept. 1, 1932 to May 31, '33	5596	4778	6353	5801	5938	4829	4121	4459
Comparison, season to date with last, %	+ 17.1	— 23.5	— 23.4	+ 22.3	+ 9.5	+ 19.9	+ 16.1	— 12.4
Degree-days, Sept. 1 to May 31, Normal	6129	4716	6274	6881	5893	4933	4626	4673
Comparison, season to date with nor'l, %	+ 7.0	— 22.4	— 22.6	+ 3.1	+ 10.2	+ 17.3	+ 3.6	— 16.3
Lb. coal per sq. ft. rad., May, 1934.....	1.360	1.664	1.512	1.496	1.136	0.992	0.568	0.280
Gal. oil per sq. ft. rad., May, 1934.....	0.117	0.143	0.130	0.128	0.097	0.085	0.049	0.024
Cu. ft. gas per sq. ft. rad., May, 1934...	16.32	19.97	18.14	17.95	13.63	11.90	6.82	3.36

Fuel consumption figures given above are based on certain conditions, and for other conditions corrections must be made. The figures assume the use of steam radiators emitting 240 B.t.u. per sq. ft. per hr., a system operating at 100% efficiency, and radiators calculated for maintaining 70° in zero weather. Heating values assumed for the fuels are 12,000 B.t.u. per lb. for coal, 1000 B.t.u. per cu. ft. for gas, and 140,000 B.t.u. per gal. for oil. To correct for other heating values, efficiencies, and design conditions, follow the method explained in the "Heating and Ventilating Degree-Day Handbook." (Percentages Calculated by Slide Rule)

Badger Expansion Joints...



Be Guided by the Policy of the Largest Steam Utility

The largest steam utility in the country, located in the east, has for years bought and used Badger *Corrugated Type* Expansion Joints. There are some 3,000 of these joints in its lines at the present time.

Why such strong preference for Badger Joints? There are two main factors:

1 no maintenance or servicing is involved because the joints do not make use of packing.

2 the joints have long since demonstrated their durability.

The value of Badger Expansion Joints has been still further enhanced by the new design of corrugation. It is the Directed Flexing corrugation, exclusive with these joints. In this new design, the flexing stresses are distributed. The life of the joint has been greatly prolonged.

Don't you think that the expansion joint that is bought and used by the thousands by *one* company is a pretty good joint to have in your steam lines?

Standard sizes up to 30" for welding or flanged end types. Monel sleeve protection for use with superheated steam.

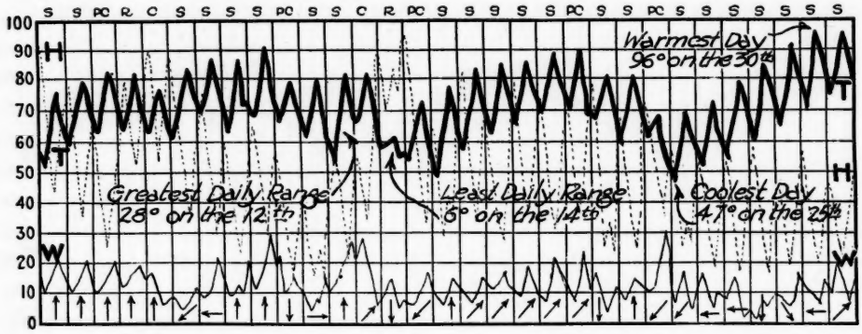
E. B. BADGER & SONS COMPANY, 75 Pitts Street, Boston, Mass.

Atlanta, Ga., 140 Edgewood Ave.
Charlotte, N. C., Independence Bldg.
Chicago, Ill., 2831 S. Parkway.
Cincinnati, Ohio, 514 Main Street
Cleveland, Ohio, Guardian Bldg.
Detroit, Mich., 702 Cadillac Sq. Bldg.
Houston, Tex., 1308 Sec. Nat. Bk. Bldg.
Indianapolis, Ind., 823 Occidental Bldg.
Kansas City, Mo., 1336 Oak Street.
Los Angeles, Cal., 812 Quinby Bldg.
Minneapolis, Minn., 732 Build. Exch.
Montreal, Que., Can. Cement Bldg.
New Orleans, La., 1666 Abundance St.
New York, N. Y., 271 Madison Ave.
Philadelphia, Pa., 1500 Walnut St.
Pittsburgh, Pa., Union Trust Bldg.
Salt Lake City, Utah, Kearns Bldg.
San Francisco, Cal., Sharon Bldg.
Seattle, Wash., Smith Tower.
St. Louis, Mo., 3605 Laclede Ave.
Tulsa, Okla., 409 East Archer Street.

BADGER EXPANSION JOINTS

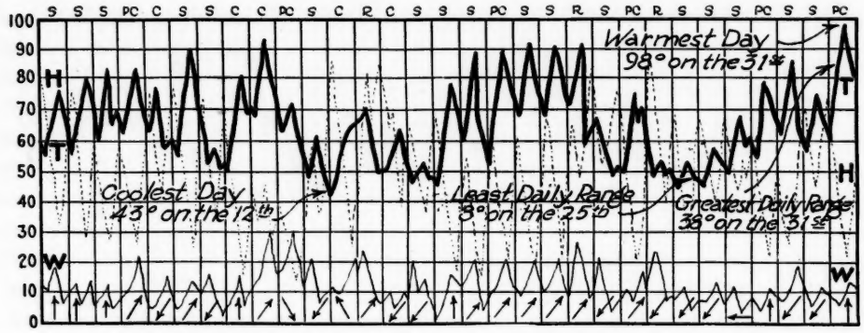
THE WEATHER FOR MAY, 1934

Plotted from records especially compiled for HEATING AND VENTILATING by the U. S. Weather Bureau. Heavy curves (T), temperatures in deg. F.; dotted lines (H), per cent relative humidity, from readings at 8 a.m., noon, and 8 p.m., except for New York, which shows hourly readings. Light lines (W), wind velocity in m.p.h. Arrows indicate prevailing wind directions. S—clear; PC—partly cloudy; C—cloudy; R—rain; Sn—snow.



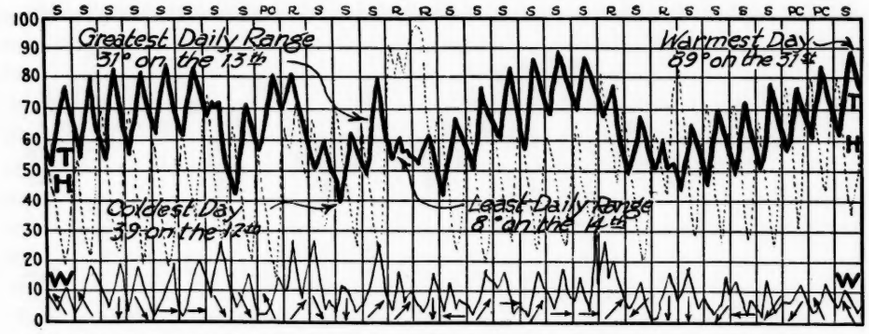
St. Louis

Mean temp. for month 71.2°; aver. wind velocity, 11.2 m.p.h.; prevailing direction of wind, S.



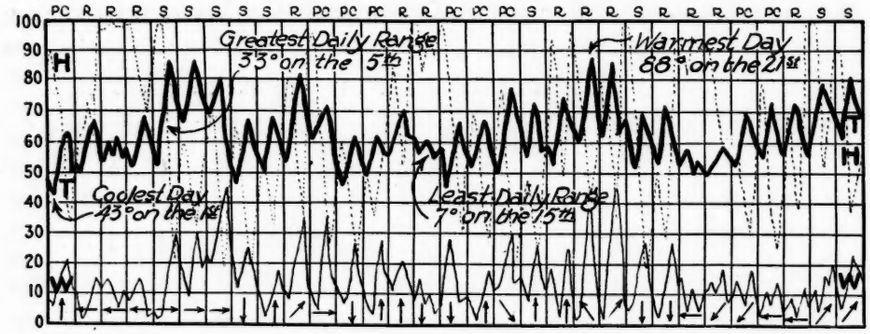
Chicago

Mean temp. for month, 65.2°; aver. wind velocity, 10.5 m.p.h.; prevailing direction of wind, S.W.



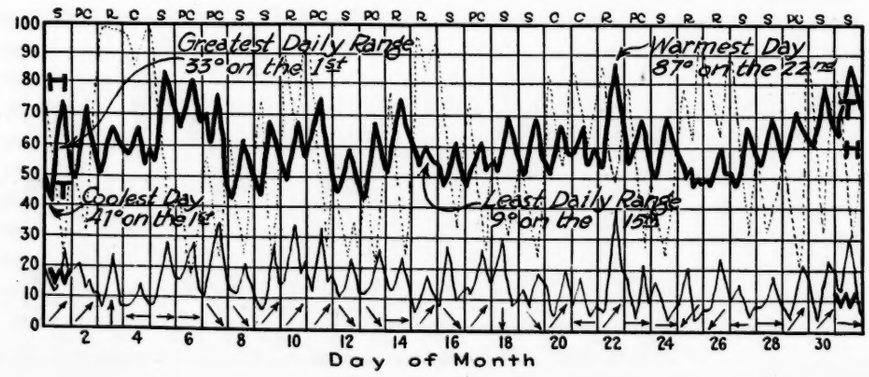
Pittsburgh

Mean temp. for month, 64.6°; aver. wind velocity, 8.7 m.p.h.; prevailing direction of wind, S.W.



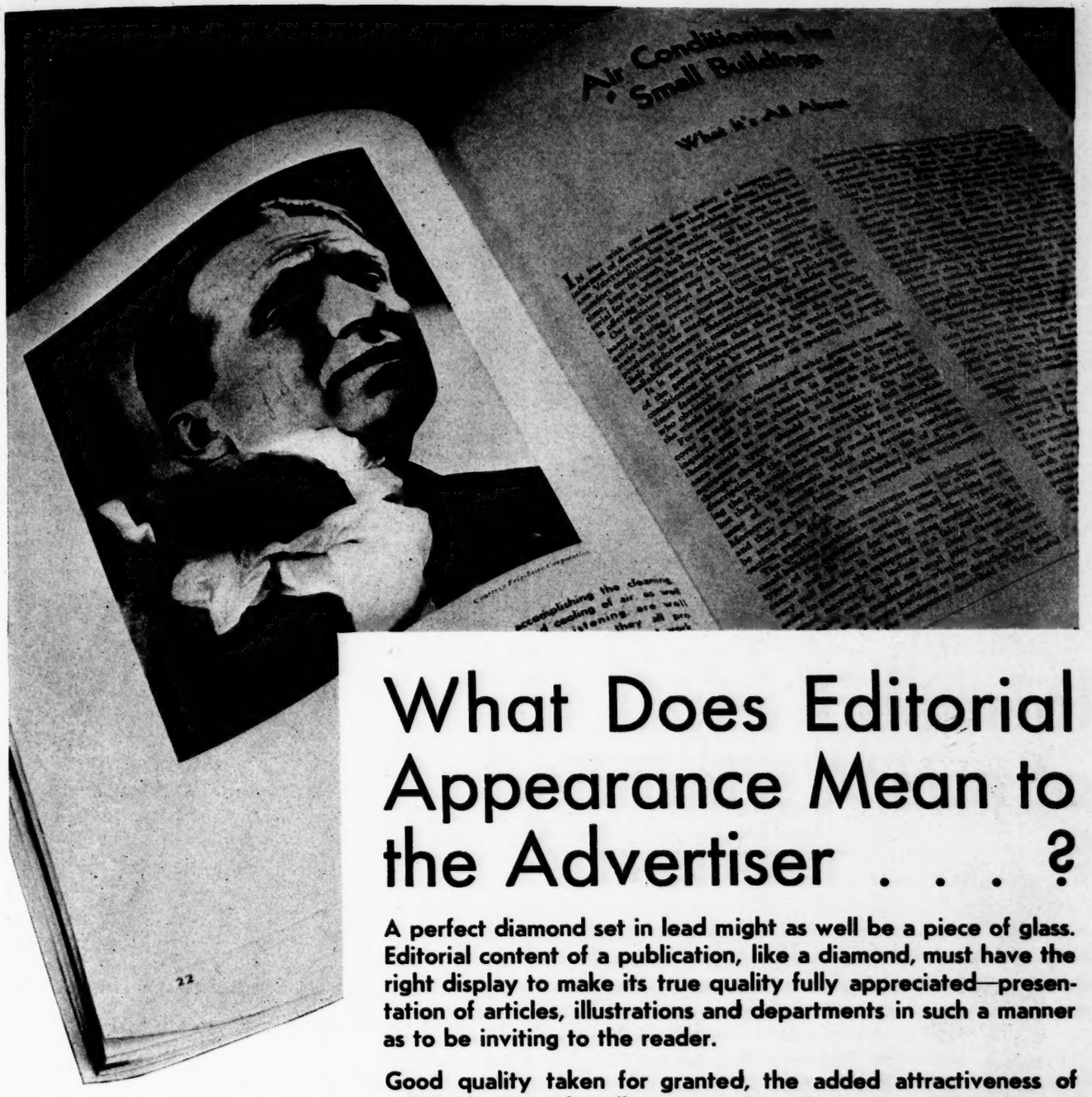
New York

Mean temp. for month, 62.6°; aver. wind velocity, 12.3 m.p.h.; prevailing direction of wind, S.W.


Greatest Daily Range
33° on the 1st
Warmest Day
87° on the 22nd
Coolest Day
41° on the 1st
Least Daily Range
9° on the 15th
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
Day of Month

Boston

Mean temp. for month, 60.6°; aver. wind velocity, 13.0 m.p.h.; prevailing direction of wind, S.W.



What Does Editorial Appearance Mean to the Advertiser . . . ?

A perfect diamond set in lead might as well be a piece of glass. Editorial content of a publication, like a diamond, must have the right display to make its true quality fully appreciated—presentation of articles, illustrations and departments in such a manner as to be inviting to the reader.

Good quality taken for granted, the added attractiveness of editorial material well presented is of greatest importance to the advertiser—it insures a well read publication and this means both editorial and advertising.

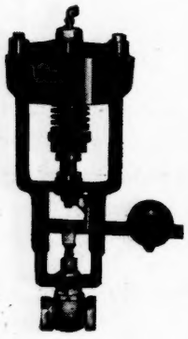
The editorial dress of HEATING AND VENTILATING is a perfect match to the high quality of its contents.

Heating and Ventilating

SERVING THE WORLD'S FASTEST GROWING INDUSTRY

"What prevents Oil Flooding of Firebox?"

"This SYLPHON INTERLOCKING SAFETY VALVE"



When a prospect talks of the danger of oil atomizing pressure failure—spike that argument immediately with a Sylphon Interlocking Valve which automatically shuts off oil flow when pressure drops below the minimum. A safety device that has never failed in an emergency—that is accepted in all states requiring safety shut-off valves by law—that has been approved by the Associated Factory Mutual Fire Insurance Companies.

This control valve, which may be used to protect one or a battery of furnaces, is easily installed in the oil supply line and requires no attention except resetting of the latch should it be required to shut off oil supply. In use on countless oil-fired furnaces everywhere. A typical Fulton Sylphon quality product that heating engineers have learned, through thirty years of experience, they may depend upon.

Write for Bulletin NH-225 which contains complete information.

FULTON SYLPHON CO.
KNOXVILLE TENN., U.S.A.

European Representatives, Crosby Valve and Eng. Co., Ltd., 41-2 Foley St., London, W. 1, Eng.; Canadian Representatives, Darling Bros., Ltd., 140 Prince St., Montreal, Quebec, Canada.
Representatives in All Principal Cities in U. S. A.

Air Conditioning Uses and Advantages Studied by Utilities

(Concluded from page 28)

ing equipment, there is a wide divergence due to the manufacturers of air conditioning equipment being recruited from various trades. They naturally, at the commencement of their operation, have endeavored to promote sales through the better of their present outlets. The dealers as listed by the manufacturers are as follows:

Heating and ventilating contractors	90%
Plumbers	37%
Public utilities	37%
Factory branches	33%
Electrical specialties	31%
Electrical contractors	26%
Exclusive agents	21%
Furnace dealers	16%
Hardware dealers	10%
Department stores	10%
Furniture stores	5%
Sheet metal dealers	5%
Theater equipment	5%
Consulting engineers	5%

The need for careful engineering cannot be overemphasized. Many comfort installations have been made that failed to function satisfactorily because some essential element was overlooked or slighted. Temperatures that chill the sensitive person are just as bad as the conditions of heat that are intended to be remedied. When constant temperature and humidity is necessary in an industrial process, the equipment must be designed to deliver these conditions, accurately controlled, or else the investment is not justified and air conditioning as an industry suffers. If special or new types of equipment are necessary in order to do the work correctly, these should be designed, rather than depending upon approximate results. In many cases it may be necessary to design special equipment.

Additional factual material included in the pamphlet has to do with the present status of ice as a refrigerant, and includes tabulated information concerning 81 installations.

National Housing Act Passed and Approved

(Concluded from page 35)

A separate corporation, to be called the Federal Savings and Loan Insurance Corporation, the $100,000,000 capital stock of which is to be owned by the Home Owners Loan Corporation, is to be set up with a board of trustees composed of the members of the Federal Home Loan Bank Board. The corporation may issue tax-exempt notes, bonds, or debentures as authorized by its board of trustees. Federal savings and loan associations are required to make application at once to this corporation to have their accounts insured by it, while other building and loan, or savings and loan, associations may do so. Only locally-operating associations are eligible and all must meet other specified requirements. Insurance of the account of any individual is limited to $5000, and annual premium

charges are limited to 1% of the amount of the accounts insured. This section has the effect of letting investors in building and loan association securities be insured against loss of principal in a way similar to that in which bank depositors are insured. It is expected that it will act as a confidence builder and encourage investors to put their funds into these local associations.

Only 27% of Urban Homes Have Central Heating

(Concluded from page 32)

Ky., and Asheville, N. C. In both of these cities 97.9% of the heating plants use coal. Coal was the least popular fuel in Wichita Falls, Tex., and Shreveport, La., both of which use this fuel in only 0.2% of the homes. Wood was most popular in Charleston, S. C., with 58.7% of the dwellings so heated, whereas Zanesville, Ohio, has only one dwelling heated with wood.

As might be expected gas reaches its greatest popularity in Oklahoma City where 87% of the dwellings use this fuel, closely followed by Wichita Falls, Tex., with 84.4% of the buildings so heated.

Of the cities surveyed oil was most popular in Nashua, N. H., where 20.8% of the homes have oil heat. Burlington, Vt., has 17.5% of its buildings heated with oil.

Warm-air heating systems are highly popular in Lansing, Mich., and Sioux Falls, S. D., 72.1% of the dwellings in the former and 67.2% of the Dakota city's houses having this type plant. On the other hand, Portland, Me., has 51.1% of its buildings heated by steam or vapor. Warm-air and steam systems are both unpopular in Shreveport, La., which has only 3 warm-air jobs and 44 steam or vapor installations. Hot water is particularly popular in Fargo, N. Dak., with 26.7% of its homes so heated, and less popular in Austin, Tex., with only 8 hot-water-heated buildings.

98.5% of the buildings in Shreveport, La., are heated by stoves, fireplaces, or other means, while in Fargo, N. Dak., only 1.6% of the buildings are heated by fireplaces and stoves. Strangely enough, the city having the highest percentage of "no heating" was Sioux Falls, S. D., a northern city.

New Catalogs

American Blower Corp., Detroit, has published a bulletin on "The New Ventura Fan," describing the new propeller-type fan available in eight sizes and used for exhaust ventilation in restaurants, garages, and similar applications. Shows the method of testing, capacity, and dimension data, and includes an example of a typical specification; standard size, 12 pages.

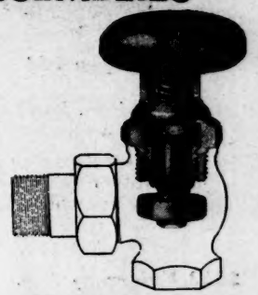
American District Steam Co., North Tonawanda, N. Y., has published an 8-page bulletin punched for loose-leaf binders, describing the company's "Piston-Ring Expansion Joint," Bulletin No. 211. Complete technical description, specifications, dimensional data, and illustrations are given.

Arco Vacuum Corp., Division of American Radiator Corp., 40 West 40th St., New York. A portfolio on "The Arco Boiler Furnace Cleaner," which includes a sales plan for dealers and contractors for selling this service, suggested advertisements for dealers to use in newspapers, and in-

"MILWAUKEE" MODERNIZATION UNITS

RADIATOR VALVE BONNET REPLACEMENT ASSEMBLIES

Made in a variety of types to fit practically all makes and sizes of packed and packless Radiator Valves. Not necessary to break line connections when making installation. Simply remove the old bonnet and replace with a "MILWAUKEE" Specialized Assembly. The old body connections remain undisturbed.

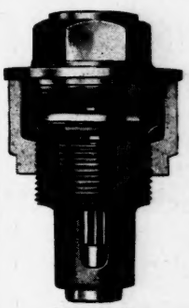


"Milwaukee" Specialized Bonnet Replacement Unit

RADIATOR TRAP REPLACEMENT UNITS

"MILWAUKEE" Specialized Trap Adaptors, installed in worn out or inefficient radiator traps of any make, restore new trap operating efficiency and give years of added satisfactory service at a very moderate cost. Made for both diaphragm and bellows type traps.

Series 26 "Milwaukee" Specialized Trap Replacement Unit Furnished with either flat or ball type Monel Seat Disc



Series 28 "Milwaukee" Specialized Angle Valve Convertor

CONVERT OLD TWO PIPE STEAM JOBS

Old type two pipe steam jobs having radiator valves on inlet and outlet ends may be completely modernized by converting into a vapor vacuum system. On the inlet valve a Specialized Bonnet Assembly should be installed and the outlet valve converted into a Thermostatic Trap with a "Milwaukee" Specialized Valve Convertor.

For complete information mail the coupon below.

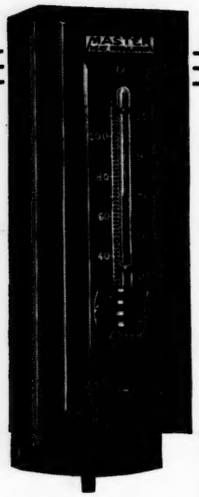
"Milwaukee" Lines are Sold by Leading Jobbers all Over the United States

MILWAUKEE VALVE COMPANY
MILWAUKEE WISCONSIN

Manufacturers of
"Milwaukee" Heating Specialties—"Approved" Bronze Valves
"Milwaukee" Valves and Fittings for the Oil Industry.

MILWAUKEE VALVE COMPANY, Milwaukee, Wis. Dept. "V"
We are interested in the following modernization units. We will need about
_____ Bonnet Assemblies ☐ for _____ _____
Quantity Trap Adaptors ☐ Size Name of maker
Please send us full particulars.

Name _____ Business _____
Street _____ City _____ State _____



Type 144

INSTANT ACTION!

When a room becomes hotter or cooler by one degree or less, the MASTER Heat Regulator acts instantly. Its sensitive thermostat insures quick, positive operation. That means much closer control of the fire, more comfort, less fuel.

***Built for long-time use*—platinum-iridium contact points—a dependable, quiet motor—non-inductive starting switch. Hooks up to regular lighting circuit. And it's a cinch to install.**

***Handsome profits.* Sell the regulator that gives instant action—long-time use. Write for details, prices and discounts to dealers.**

WHITE MANUFACTURING CO.
2362 University Ave. St. Paul, Minn.

MASTER HEAT REGULATOR

ADSCO Casing

"Red Diamond Brand"

for *Underground Steam* and *Hot Water Pipe Lines*

ADSCO Red Diamond Brand Casing — the ideal combination of conduit and insulation — for underground steam and hot water lines.

A conduit that does not expand and contract longitudinally—assuring permanent waterproof construction. More than 91% efficient. Strong and durable —found to be in perfect condition after being installed more than 25 years. Lowest installation cost.

Also furnished in split form for two or more pipes.

Write for Bulletin No. 1110.

AMERICAN DISTRICT STEAM COMPANY

GENERAL OFFICES AND WORKS
NORTH TONAWANDA, N.Y.
OVER FIFTY YEARS IN BUSINESS

structions on how to tie-in the cleaning business with getting new work. The company claims that 60% of the furnaces and boilers cleaned need repairs or replacements and that cleaning offers a way of dealers getting repair business. In addition, this business is the means of profit during the off-season.

Barber-Colman Co., Rockford, Ill. Standard size loose-leaf bulletin describing "An Electric System of Temperature Control," with complete data, specifications, and illustrations of the company's thermostats, damper controllers, humidity controllers, motor-operated valves, solenoid valves, accessories, and control systems.

A. M. Byers Co., Pittsburgh, Pa. A 16-page standard size descriptive bulletin on the company's wrought-iron plates. The use of bleed photographs throughout the book, illustrating typical applications of the line, together with the striking colors in which the book is printed, make this an unusually attractive catalog. Describes wrought iron and why engineers should be interested in it; lists the broad applications where this material is especially desirable. Includes dimensional data.

Chase Brass & Copper Co., Inc., Waterbury, Conn., has published a bulletin on Chase copper tubing for heating lines. The company reports that practice in the use of copper pipe for heating lines is not as yet standardized, but in this bulletin it has listed certain suggested rules of practice and summarized other available information on the subject. It describes the Types K, L, and M tubing and recommends Type M for new installations and Type L for modernizing jobs, lists the general advantages of copper tubing for heating and gives tables on the comparisons of capacities of iron pipe and copper tubing as well as comparisons of heat loss with different types of piping; standard size, 12 pages.

C. A. Dunham Co., 450 East Ohio St, Chicago. "Dunham Differential Installations," a standard size, 32-page booklet describing some of the company's outstanding Differential jobs. Each installation is featured on a full page. Information given includes, in addition to illustrations, a brief description of the building and plant and in many cases detailed data on the savings, as well as names of architects, engineers, and contractors.

Gorton Heating Corp., Cranford, N. J., has published Bulletin 100, describing the Gorton single pipe vapor heating system. Contains descriptions of the specialties which make up the system, roughing-in dimensions and photographs of buildings in which typical installations have been made; standard size, 8 pages.

International Heater Company, Utica, N. Y. An eight-page folder, "Air Conditioning," describing the company's line of Economy and Carton warm-air furnaces and air conditioning equipment, including blowers, filters, washers, and other apparatus; standard size.

Jenkins Bros., 80 White St., New York, has published an unusual piece of valve literature—a 12-in. cut-out replica of a Jenkins iron body gate valve. This cut out provides an exact reproduction of both the exterior and the mechanism of a heavy Jenkins Valve. An accurate listing of the features of design and construction also is given in a form which makes it convenient for valve users to follow the suggestion to "compare point-for-point with other good valves and let your own judgment say which one is best."

Lewis Air Conditioners, Inc., 829 Second Ave. S., Minneapolis. A six-page folder "Lewis Air Conditioning," describing the company's line of cabinet and central type air conditioning units. Cut-away views show the construction of the apparatus. Dimensional and capacity tables, together with specifications, are included; standard size, in color.

The Linde Air Products Co., 30 East 42nd St., New York. Those concerned with the hiring of welders will be interested in the 24-page illustrated booklet entitled "The Testing and Qualification of Welders," published by this company. The purpose is to outline simple tests for measuring

the ability of welders. It is pointed out that welding technique differs somewhat with the materials to be welded and with the type of joint. Separate sections of the book discuss in detail the fracture test, bend test, tensile test, and observation test. Summary of existing and pending qualification tests for welding steel plate and pipe are given.

The Linde Air Products Co., 30 East 42nd St., New York, by reason of recent important advances in the use of the oxy-acetylene bronze-welding process, has found it necessary to bring out a new edition of its eight-page pamphlet entitled "The Progress of Bronze-Welding." Similar in form to previous editions, it contains a comprehensive and instructive story of bronze-welding in all its phases.

Ozone Pure Airifier Co., 1455 West Congress St., Chicago. A 30-page standard size catalog, "Ozone in Ventilation," describing the company's system of ozone generating, the uses of ozone in ventilation, with technical data and illustrations of installations.

The Parker Appliance Co., 10320 Berea Rd., Cleveland, recently issued Bulletin No. 35, listing its line of tube couplings with typical applications, symbols and abbreviations of the numerous fittings available, specifications, and catalog information; standard size, 35 pages.

Perfection Stove Co., Cleveland, has issued two standard-sized mimeographed booklets for salesmen, dealers, and sales engineers. The one, "Superfex Heating Plant—Complete Sales Plan," includes complete instructions and advice to dealers as to how to go about specialty selling and contains samples of the manufacturer's promotional literature available to the dealer. The other, "The Straight Line Heating Calculator," is a 44-page book developed for the designer of warm-air and air conditioning systems. Straight line alignment charts assist in the rapid calculation of the various steps from calculating the heat loss to the determination of duct sizes, with complete instructions and sample calculation.

Russell Electric Co., 346 West Huron St., Chicago. Folder describing the company's unit sales plan for furnace-heated homes. One unit consists of temperature control equipment; one of humidity equipment; one of circulation and filtering apparatus, and one for summer cooling. Folder describes and illustrates completely the different units and gives prices; standard size, 8 pages.

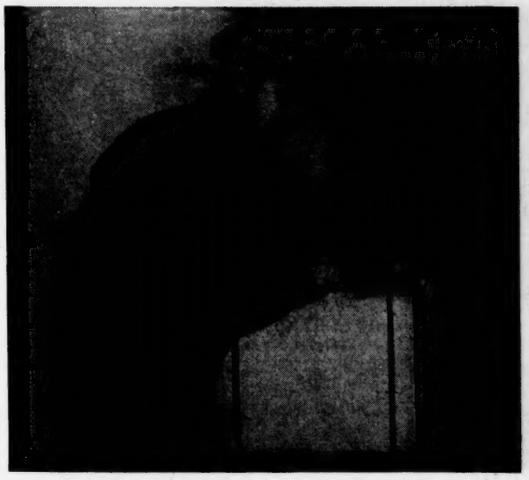
Stay-Rite Co., Inc., 1250 West 4th St., Cleveland, recently issued a folder on Stay-Rite heating specialties. It includes the company's line of radiator traps, packless valves, quick vents and float vents, float traps, inverted bucket traps, boiler return traps, gas throttling valves, and temperature regulators; standard size, six pages.

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., has issued three circulars describing air conditioning apparatus and the advantages of installations in offices, restaurants, and apparel shops entitled, "Level Off The Curve of Office Weather," "Air Conditioning a Tested Recipe for Restaurant Profits," and "Air Conditioning Custom Fitted For Stores and Shops." Photographs of installations, explanation of the unit air conditioning system, and a complete description of each type of equipment are included; standard size.

Wolverine Tube Co., 1411 Central Ave., Detroit, has issued a bulletin containing installation and dimensional drawings of the company's line of concealed copper heaters. Included are photographs of the heating element and of the cabinets and grilles, illustrations of typical installations, and tables of capacity; standard size, 16 pages.

Young Radiator Co., Racine, Wis., has issued Catalog 434, describing and illustrating with technical data and capacity tables, the company's line of unit heaters and coolers; standard size, 4 pages.

WHEN PARTS AND REPLACEMENTS Are Needed Quick USE RAILWAY EXPRESS



Swift service means dollars saved when parts and replacements are needed. A few days' delay in getting equipment can often result in serious difficulties. So it pays to ship all items by Railway Express. That means transportation at passenger train speed, absolute safety in transit and rush service on arrival at destination.

Whatever you may wish to ship in the nature of heating or ventilating parts or new equipment, you will find that Railway Express can serve you best. We give a receipt on collection and take a receipt on delivery—with liability up to $50 on each shipment of 100 lbs. or less—and at the same ratio (50¢ a pound) on heavier shipments.

Telephone Railway Express for service or information.

The Best There Is In Transportation

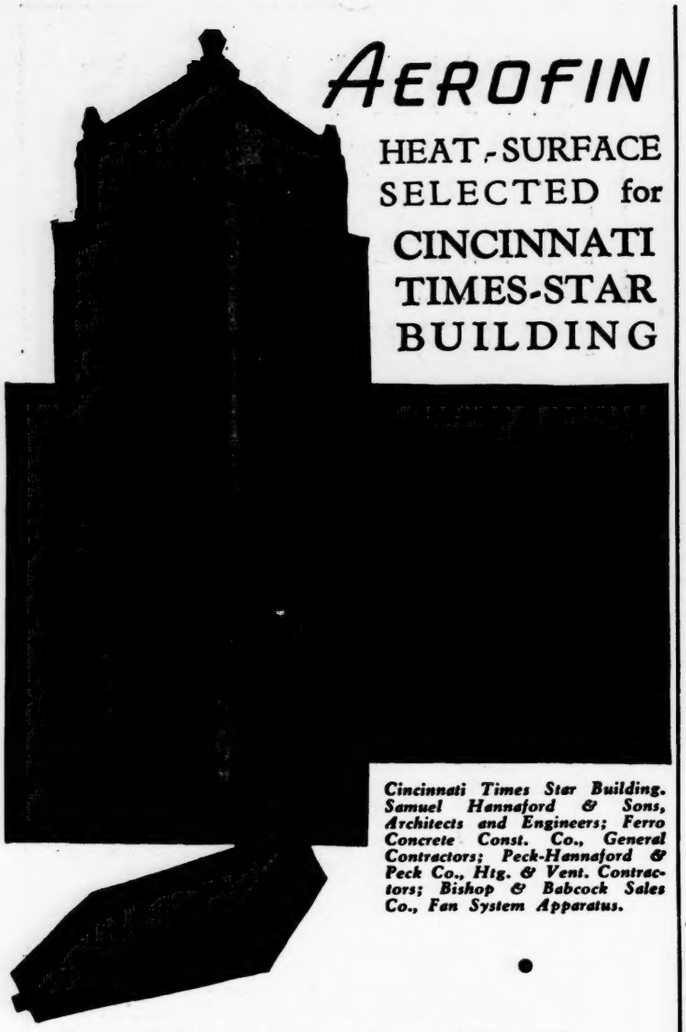
SERVING THE NATION FOR 95 YEARS

RAILWAY EXPRESS AGENCY, Inc.

NATION-WIDE SERVICE

AEROFIN

HEAT-SURFACE SELECTED for CINCINNATI TIMES-STAR BUILDING



Cincinnati Times Star Building. Samuel Hannaford & Sons, Architects and Engineers; Ferro Concrete Const. Co., General Contractors; Peck-Hannaford & Peck Co., Htg. & Vent. Contractors; Bishop & Babcock Sales Co., Fan System Apparatus.

•

Flexitube Aerofin, a modern standardized light weight fan system heat surface. Available in 12 and 18 tube face, 1 and 2 rows. Also Aerofin Universal and High Pressure type and Aerofin Booster Units.

•

AEROFIN Heat Surface is found in the more important buildings because it is *years in advance*. It is specified by leading architects and engineers because of *proved superiority*.

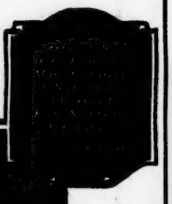
It is installed by progressive heating contractors because they know that AEROFIN gives complete satisfaction.

It is sold only through manufacturers of nationally advertised fan system apparatus for your protection.

Whatever you have wished for in a Fan System Heat Surface you will find in AEROFIN.

That is why it is almost the universal choice of engineers and architects who know what superior design and workmanship means—who appreciate the exclusive features found only in AEROFIN.

The home office in Newark or any of our branches will gladly send you complete descriptive literature or render prompt personal and efficient technical co-operation. Write today to the address below.

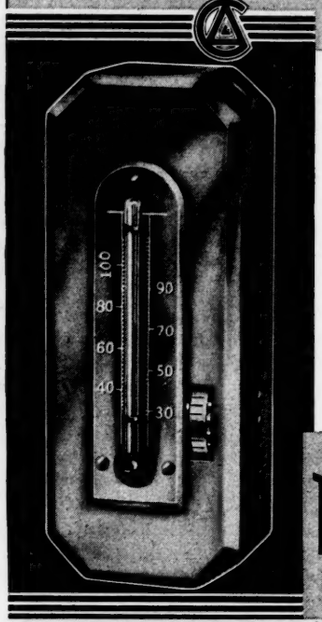


AEROFIN CORPORATION
850 Frelinghuysen Avenue
Newark, N.J.

DETROIT LUBRICATOR COMPANY

ASSURES AUTOMATIC PRECISION CONTROL IN ALL "GENUINE DETROIT" PRODUCTS

by



THE EXCLUSIVE USE OF "CHACE" BIMETAL

Where automatic control of temperature is the aim; or where automatic control actuated by temperature changes, is desired, use Chace Thermostatic Bimetal as the active element of your control. Sold in:

SHEETS • STRIPS • FORMS

CHACE THERMOSTATIC BIMETAL
"It Bends with the Heat"

W. M. CHACE VALVE CO.
1606

IN SCHOOL AUDITORIUMS

This **Locked NU-NOTCH** Assures Even Air Distribution

The Nu-Notch Mushroom Ventilator is now supplied with a special locking key, thus preventing tampering with the adjustments of the air flow. 10 recessed notches give perfect control. Made in Dome or Flat Top type. Easily set on wood or concrete floors.

Send for further information on other Knowles Air Diffusing Devices.

KNOWLES MUSHROOM VENTILATOR CO.
41 North Moore Street NEW YORK, N. Y.

Sarco and dependability are synonymous in the minds of Architects and Engineers who know the

SARCO Heating System

Perfect performance, long life and true economy are assured when you specify the "SARCO"

Catalog P-45 *sent on request.*

SARCO CO., INC.
183 Madison Avenue,
New York, N.Y.
Branches in Principal Cities

RECOGNITION

★ ★ ★

Recognizing the strides made in the development and application of HEATING STOKERS, especially those in which fan, motor, transmission, and controls are all incorporated into a unit design, HEATING AND VENTILATING features in both this and the coming September number a special section on these devices. In this issue you will find a reference list which makes available for the first time the principal mechanical items incorporated in this class of fuel burner.

This list, together with the other numerous features of this issue, forms another instance of the valuable reference material prepared especially for the needs of the engineer and contractor having to do with the specification, purchase and installation of all kinds of Heating, Ventilating, Air-Conditioning and Cooling Equipment.